Possibilities 2050

An assessment of
the world's prospects
mid-century

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For my grandchildren
and for yours too

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An assessment of the
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Contents

Disclosure: this report is written by an independent, original thinker with knowledge in world history, geopolitics and meaning-of-life matters. Palden is not affiliated with any political or campaign organisation and he speaks for himself. His hope is to stimulate all-round rumination on the matters covered here. As reader, your agreement with this report's contents is not required: may it help broaden your understanding and help you form your own conclusions!

Before we start

There are known knowns – these are things we know that we know. There are known unknowns – that is to say, things that we know we don't know. But there are also unknown unknowns – things we don't know we don't know. – Donald Rumsfeld, US Defence Secretary, 2003.

This is a concise survey of the conceivable possibilities for the world around the year 2050, mid-century. It is kept reasonably simple to help you gain an overview of the plethora of issues before us, without going into too many details, complexities and technicalities. It examines the potential situation in the mid-21st Century from a variety of angles. It highlights a range of questions, some of them awkward, that need attention if humanity is to survive and thrive in future.

We all have our specialities, and getting our heads around issues outside our sphere can be difficult. So this is written to help you formulate an all-round picture of the future and what to do about it in the context of your own life and situation.

The only thing we can safely say about the future is that it cannot reliably be predicted. There are too many variables, unknowns and complexities to make dependable forecasts. All the same, likelihoods can be identified. The best approach is to look at overall trends and potentials that are visible today or that lurk under the surface – *megatrends* – and at mechanisms shaping the future. What's most important is that we prepare our thoughts for a spectrum of possibilities.

Much can happen between now and mid-century, given the intensifying global dynamics at play today. A multiplicity of issues seem to be approaching a critical point in coming decades, from ecological degradation to population growth to remarkable technological breakthroughs. Things won't return to normal, and conditions could be harder than we want, yet there will be redeeming factors. Even miracles can happen – after all, sensible, considerate, morally consistent, cooperative human behaviour would constitute a miracle, and there's little that's esoteric about that.

It is not in our gift as humans to control all of the issues mentioned here: big and complex factors are at work, some natural, some unexpected and many of them the outcome of multiple layers of human action, reaction and error, and the incidents, decisions and omissions of former times. What will *actually happen* over coming decades remains to be seen, and much will depend on how we respond to events and developments as they arise.

Many forecasts see 2050 as a likely crux point in world history where a number of trends together come to a climax – population, climate, resources and other factors. It could even be argued that we are living through a *crux century*, stretching perhaps from around 1970 to around 2070. A century seems like a long time but the European Renaissance, modernity's dawn, had a similar duration.

The world has tended to prioritise national, sectoral, narrower and shorter-term interests over longer term, wider, global issues. This is problematic. Longterm, wider considerations are now pulling harder on our attention. *"Progress on an incremental, piecemeal, business-as-usual basis in the coming decades will not be enough"*, says the OECD, in its 2012 forecast for the world in 2050. That's a staidly respectable organisation saying that.

One theme of the 21st Century is the unfolding of *consequences* – consequences of issues and megatrends already at play today. Two examples are population growth and the risk of nuclear war. Population growth underlies every single subject covered in this report – it is perhaps the biggest single driver of change today. Meanwhile, one relatively localised nuclear conflict could not only wreak destruction on large numbers of people, ruining and irradiating whole landscapes, but also change the global climate in just one week, bringing a nuclear autumn or winter. Just these two of many other issues need taking in hand if the future is to be promising for our descendants.

Scenarios and possibilities

There's a difference here between *making big decisions* (to phase out fossil fuels or eliminate poverty, for example) and *responding to defining moments and crunches* (such as dealing with financial crises, conflicts, pandemics or disasters). What's important here is the way that people and countries deal with game-changing, defining moments and tipping points, during which much is decided very quickly, whether by intent, by accident or by force of events.

Four conceivable generalised scenarios can be postulated for the future: *manageable*, *difficult*, *disastrous* and *transformative*. In different parts of the world, each scenario could play itself out differently at the very same time. This is what we see today: some live in relatively blessed circumstances and others subsist in a living hell, all on the same planet, simultaneously. People in Malibu or Dubai live in a totally different world to people in Gaza or Kinshasa.

A manageable future is one in which, relatively speaking, our luck holds, evolving circumstances aren't as bad as some people fear, the powers-that-be make sensible decisions and world society adapts well enough to intensely changing conditions. The world implements blueprints such as the UN Sustainable Development Goals, instigating responsible business, government, social and ecological good practice, improving international relations, reducing consumption, improving resilience and sustainability, reducing inequality and making bold responses to unfolding events. This relatively comfortable option is what most people would prefer, though it nevertheless means managed, large-scale change, and much more change than we anticipate today. Some will be winners and some losers, and one key question is whether the gap between them grows or shrinks and whether losers are catered for or left to suffer or die, as we have left Yemenis, Syrians and Congolese to their sorry fates today.

A difficult future involves serious crises and things getting much harder, not just for the poor and the marginalised but for everyone. It involves scarcities, painful conflicts of interest, tough events and complexities, perhaps war, pestilence, superstorms, geopolitical and other threats and critical crunch-moments. There could be mass migrations of people seeking food and safety. In parts, lawlessness could break out. Safe, secure countries could become a memory. Governments and economies struggle, positive changes move too slowly, anxiety goes global and many people experience significant loss, but the world system more or less holds up. Humanity gets through it, scarred but alive, by late-century – conceivably by going into an emergency-mobilisation mode. The world would change radically, and not in a way we would like. Though there could also be compensating factors, amazing breakthroughs and remarkable moments, even under duress.

A disastrous future sees us encountering shocking, overwhelming, currently inconceivable catastrophes. It could mean the end of humanity. Or we might survive in a much reduced condition, with most people dead and much destroyed. It is survival-of-the-fittest, the lucky and the most-organised. Cities might become uninhabitable. The world's climate goes severely out of balance. It is devastation. The interdependent organisational systems needed for the civilisation we now know would be gone. It is then a matter of how survivors, if any, progress from there. This scenario most of us would prefer not to contemplate but we *must* consider it as a possibility. Our overall handling of events and developments today fails to ensure that we will avoid this option.

A transformative future is one where, in answer to show-stopping situations and circumstances, the world's people and countries decide to make fundamental adaptive changes in their manner of operation. The nature of the game would change from bottom to top. This would be a spirited psychosocial, as well as a material and a systemic shift – and not without challenges. We would start grappling with issues and problems very differently, reorienting the direction, rules, norms and priorities of society, international relations and our relationship with the natural environment (for example, by instituting a 'circular economy'). At heart this would involve a profound shift in the way we see things. Sounds idealistic, perhaps, but it would more likely be made up of pragmatic strategies to deal with high-impact, real challenges. It wouldn't be heaven – more the application of

unusually good sense and realistic cooperation, together with a mobilisation of all available, particularly human, resources. Things would start looking and feeling very different.

A precedent is the WW2 war effort of 1939-44 in Britain, in which society and the economy were transformed in 2-3 years from a capitalist to a command economy, in response to threatening circumstances. It worked, more or less, though it demanded national unity, strong leadership, public consent and mobilisation, fairness, rationing of essentials, major acts of trust and many selfless sacrifices. Public will and consent were important, as also they shall be in coming decades.

We must consider two further matters. The first: it's important to avoid skewing our picture of the future with predispositions inherited from the past. This concerns *what we want* and *what we fear*. We all have our various positions, beliefs and preferences and we each see the future through a certain optic. This report has its perceptual biases too – that's unavoidable. The future will be sculpted amidst a ferment of viewpoints and a multiplicity of situations, a process of jostling. A variety of futures will arise for different people and in different regions. This will summate into a multifarious global totality. Hopes and fears don't necessarily help, and can make things worse.

The second: *we will get what we get*. The key question here is *what will actually develop* by mid-century – not necessarily what we want, visualise, campaign for or dread. What unfolds will be the reality people of the time will have to live with. Estimating what this might look like is an elasticising experience, posing a challenge to explore unthinkables and look beyond the reality-field of knowns, accepted opinions and comfort-zones of today. John Lennon once sang, *life is what happens when you're busy making other plans*, and there's truth in it.

Of defining moments and black swans

By 2050, people won't judge things by today's norms. Millennials and their children will decide the shape of mid-century reality, especially in the developing world where they are numerically the largest generation. Things we now consider remarkable, unimaginable or outrageous will become the new normal. New issues we haven't considered will appear, and some anticipated probabilities will not happen at all, or not in the way we anticipate, or not leading to the consequences we currently expect. And life will go on.

Only part of the future will be forged by making thought-through or principled decisions. Much of it will arise from questionable choices, dodgy politics, ricocheting circumstances, evolving facts, luck, opportunism, profit perceptions, corruption, brilliance, incompetence, errors, incidents and accidents. *Black swans* will be involved – events and developments that no one believed possible until they actually happen. Centuries ago, people thought that swans were white only, until in 1790 black swans were found in Australia – hence the name.

The term was recycled by a Lebanese-American statistician and risk analyst, Nassim Taleb, to explain three observed phenomena: 1. the disproportionately large role of unpredictable and unexplainable events in history, finance, science and technology; 2. the scientific impossibility of predicting such unexpected events in advance; and, 3. the biases that cause people to avoid factoring uncertainty into their ideas for the future. In other words, knowns make us feel comfortable, and we rule out unknowns because they make us feel insecure.

Recent instances of black swan events have been the 1989 fall of the Berlin Wall, the 2008 Credit Crunch, the 2014 rise of the Islamic State, Brexit and Donald Trump in 2016. Go back a few years before each of these events and they were unforeseeable, impossible, to most. After they happen we re-edit our mental maps to incorporate such events as if they had been expected, but they weren't. Black swans will continue happening – this is guaranteed – though their nature, shape and size is the stuff of guesstimates. This makes forecasting difficult, but factoring in black swans is necessary. Airplanes, cars and computers were once impossible, and so too, before your birth, were you.

Events tend to evolve in pattern-setting jumps – periodic defining moments where the game-plan changes critically. The period from 2008 to 2014 was like that, beginning with the banking crisis, progressing to the Arab revolutions and leading to the barbarity displayed by the Islamic State. Once patterns have been reset, further developments extrapolate from there. Our sense of the future's possibilities is shaped by groupthink and received beliefs, a safe territory of knowns and expectations established by consensus or in the utterances of experts and authorities. But things can head in other directions, and more and different things can happen than we bargain for. In a sense, events are not guided solely by the past – it is almost as if the future pulls the present forward, toward possibilities or inevitabilities we hadn't quite reckoned on.

These shifts happen suddenly, sometimes surreptitiously. The tipping point in today's shift of power from the West to Asia was the 2008 Credit Crunch – a defining moment that most people thought was a banking crisis, but its implications were bigger, deeper, further-reaching and historic in scale. There will be further tipping and inflection points, each preceded by incremental shifts along a trajectory that suddenly goes critical and changes, and 2008 was such a moment. Expect more.

Even so, the after-effects of such shifts take time to emerge. In the late 2010s there was a flurry of technological advances arising from ideas hatched around 2008-12 in hidden away labs, backrooms and meetings. It takes time for things to unfold, even when a tipping point has been crossed. Not only this, but the symptoms of a defining moment can appear in disguise, looking as if the wrong thing is happening when things are actually going strangely right.

Around 2008-12, Asia discovered that it had a serious pollution problem – smog and toxicity. Up to that point, nagging Westerners with their environmental concerns were not fully believed in Asia. This discovery marked a tipping point after which Asia became the leading source of momentum in a global clean-up that will unfold in future years. The West will contribute significantly since it has had a head start, but the leading impetus now comes from Asia. That wasn't expected.

In surveying the future it is thus necessary to factor in defining moments, tipping points and black swans. By their very nature, and because of our *normality bias*, we don't easily see them coming. But they come anyway. Talking of which, there is a fifth possible future world scenario that we must mention here, an *apocalyptic scenario* – apocalypse meaning 'revelation', not catastrophe. There is the smallest of chances that the greatest of all black swans could occur, in the form of a global, simultaneous shift of public awareness or perception of manifest reality that brings a radical and wholesale shift of priorities worldwide. In some cultures this would previously have been anticipated as a return of the Christ, or of the Mahdi, or of a sudden dawning of a new age, or some other such miracle cure for our woes. This possibility grates with the modern rationalist mindset, though for some people it is an article of faith. Although several end-of-the-world and redemption mega-events have been predicted in the last fifty years, none has happened – at least, noticeably.

If this report suggested that, by 2050, an apocalyptic scenario were to happen, it would quickly lose credibility. But it is wise not to completely exclude such remote possibilities, even when they confront our normality bias. They might look improbable, impossible or illogical, but it is also valid not to lock that door since, should it happen, we might be faced with very rapid choices, for which we might be unprepared. We should accommodate the slim possibility of enormous black swans in our future calculations. *"Trust in Allah, and tether thy camel"*, goes the Arabic proverb. Have faith in whatever you believe in, but do the sensible thing anyway.

About this report

It is divided into chapters covering different aspects of the world situation. These pull in quite differing and contrary directions, and that's a key problem. Their presented order in this report does not reflect their order of importance. We're looking at a multifaceted hologram.

By necessity, a concise work like this cannot include statistics, evidence, discussions, explanations and footnotes, otherwise it would fail to be concise. Were it lengthy and erudite, readers would set it

aside for another day – *"Interesting, but I don't have time"*. Herein lies another problem: the Big Picture is very big to comprehend. So it has been boiled down into a succinct overview, and useful links are given in each chapter, allowing some follow-up.

The scale and breadth of what we need to consider makes this whole question perplexing. It would be good to present a consistent, all-embracing plan for the future, but this is neither easy nor advisable since the paradoxes, inconsistencies, contradictions and hypocrisies of our day lie at the heart of this question. Many factors pull in different directions. This dissonance is problematic. The world is in an enormous mess and tangle.

Many people understandably switch off, set the matter aside, wring hands or ruminate in quiet concern, and we all have busy lives to get on with. So we tend to give only passing concern to these issues and then we return to our hectic schedules. Yet clarifying the issues that are visible today will surely help us see more clearly through the swirling fog of the longterm. Whether or not we act sensibly is *the big issue*, especially since our grandchildren will inherit the results.

Methodology and sources

The initial intention was to survey the existing literature to report on the overall drift of future-oriented thinking. In doing the research it was found that the literature is patchy, tilting in contradictory directions, some of it neither useful nor very forward-thinking. Researchers often report what they believe their sponsors want to hear, or they avoid career-killing statements, or they seek publicity or support, or they stay within their own silos, ignoring the rest.

Many reports on the future focus on technology – generally upbeat, distorted by the billion-scale profits involved and airbrushing over complications and impediments. Economic research often stays within a set of business-friendly assumptions to bolster market confidence, reinforcing corporate groupthink. Climatic and ecological research tends understandably toward dismay and pessimism, motivated by a need to persuade governments and the public to take it seriously, as well as to counteract the views of deniers. Geopolitical analyses depend greatly on what side you're on and on national perspectives. Research on the future of society is scanty – journalists tend to be good at this. Some material is over-idealistic and some, conversely, lacks vision. Very few writers survey *the whole, wide picture*. Though a few do.

So there has been a need to cross silo-boundaries, fill gaps, stretch beyond current memetic perspectives, go deeper and bring skyscraper thinking down to ground floor. The report does not claim to be authoritative, though it is carefully researched and thought through. It is intended to help readers get through the mental gymnastics involved in seeing how things fit together, and how they don't fit together. One recurrent theme throughout is rarely mentioned in the available research: the shape of the future depends greatly on humans' foibles, political choices and sometimes madnesses.

We start with the UN Sustainable Development Goals, a global programme of action agreed by UN member states. Whether or not this plan works, it is well intentioned and constitutes a serious and rare attempt at formulating a body of global aims for nations and institutions to follow.

Thanks for reading. Now let's start the journey.

Palden Jenkins
Cornwall, UK, 2018.

The UN Sustainable Development Goals

This is the closest to a global plan that we have. It was agreed by UN member states in 2015, following on from the Millennium Development Goals (MDGs) of 2000-2015 and setting seventeen goals and 169 targets for all countries to achieve by 2030.

- *End poverty*. Extreme poverty was halved between 1990 and 2015, but wider signs of poverty also include poor healthcare and education, hunger, discrimination and political exclusion.

- *Zero hunger and malnutrition*. Doubling agricultural productivity and the incomes of small-scale food producers, ensuring sustainable food production systems, improving land and soil quality, maintaining the genetic diversity of seeds, preventing trade restrictions and distortions in world agricultural markets, limiting food price volatility and eliminating waste.

- *Good health and wellbeing*. Universal health coverage including access to medicines and vaccines, ending preventable deaths of new-borns and under-fives, ending epidemics such as AIDS, TB, malaria and waterborne diseases, and preventing and treating substance abuse, death and injury from traffic incidents, hazardous chemicals, pollution and contamination.

- *Quality education*. All girls and boys to complete free, equitable and quality primary and secondary education (a key ingredient in economic growth and change in social attitudes).

- *Gender equality*. Providing women and girls with equal access to education, healthcare, decent work and representation in political and economic decision-making processes.

- *Clean water and sanitation*. Safe drinking water, water sources and hygienic toilets.

- *Affordable, reliable and clean energy*, including goals to increase renewable energy.

- *Decent work, full employment and economic growth*. Longterm economic development, reduction of youth unemployment, living wages, acceptable working conditions.

- *Industry, innovation and infrastructure*. Building resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation and entrepreneurship.

- *Reduced inequalities* within and among countries. Redistributive taxation, equality of opportunity, fair remittance costs and low import duties favouring least-developed countries.

- *Sustainable cities and communities*. Inclusive, safe, resilient and sustainable cities with well serviced and affordable housing, adequate public services and urban impacts.

- *Responsible consumption and production*. Eco-friendly production, waste and pollution reduction and sustainable practices.

- *Climate change*. Combating climate change and its impacts by regulating emissions and promoting developments in renewable energy.

- *Oceans, seas and marine resources*. Dealing with pollution, acidification, plastics, species conservation, shipping and coastal and fishery conservation.

- *Life on Land*. Protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification and halting and reversing land degradation and biodiversity loss.

- *Peace, justice and strong institutions*. Promoting peaceful and inclusive societies, access to justice for all, and effective, accountable and inclusive institutions at all levels. Reducing violent crime, sex trafficking, forced labour and child abuse.

- *Partnerships for achieving the goals*. Developing international cooperation and multi-stakeholder partnerships to share knowledge, expertise, technology and financial support. Responsive government and public-private partnerships involving civil society.

However, there are problems with these goals. Some conflict with others: there are inherent conflicts particularly between economic, social and environmental aims. Also, the cost of achieving these goals is high and, under current conditions, arguably it is politically unrealistic, requiring about $2-3 trillion per year until 2030, at a time when pledged funding and paid-up funds can differ considerably – a regrettably common habit today. Estimates for providing clean water and sanitation alone could be as high as $200bn.

SDG implementation started in 2016. Governments are required to translate the SDGs into national legislation, develop a plan of action, establish budgets and search for implementation partners. There is a reporting and monitoring problem since many nations massage their figures to appear compliant, or they apply measures that are not entirely beneficial overall (they just look good, or they can serve veiled vested-interest purposes), or they simply say one thing and do another. Meanwhile, the UN has few sanctions it can apply for non-compliance.

One unstated development goal seriously affects and contradicts the above-named SDGs: *making a profit*. The international system is a capitalist system, and corporate profit priorities clash with many of the problems that the SDGs set out to address. So the current world business climate can impede progress in achieving the SDG aims. There is therefore a serious glitch with the SDGs inasmuch as they attempt to bring about their noble aims without addressing more fundamental systemic changes needed to deal with the excesses and impacts of the global economic system.

The SDGs are therefore weakened and, while notable progress will indeed be made with these goals by 2030 and many benefits will arise from them, a tension between the aims of the SDGs and those of the economic system and its main beneficiaries – richer countries, investors, corporations and well-off consumers – will undermine them. This is a critical issue.

We are thus faced with an unresolved question of global priorities. *This single matter lies at the heart of all calculations concerning the world's future*. Until it is resolved, the world attempts to move in two divergent directions – toward both profitable aims and sustainable and just aims. This jeopardises our longterm future. It represents an unclarity over the world's primary goals and objectives. This is seriously problematic. This issue, currently avoided, is likely to become critically unavoidable at some point in the future.

Interesting links

SDG Index, Bertelsmann, 2016 (*about progress being made, nation by nation*).
http://www.sdgindex.org/assets/files/sdg_index_and_dashboards_compact.pdf

Critique of the SDGs, Yale Univ, 2017. https://campuspress.yale.edu/thomaspogge/files/2015/10/SDG-HR_Rev-Jan-25-uugh97.pdf

Three Challenges facing the UN's Sustainable Development Goals, WEF, 2015.
https://www.weforum.org/agenda/2015/08/3-challenges-facing-the-uns-sustainable-development-goals/

Global Pressing Problems and the Sustainable Development Goals, GUNI Network, Catalonia, 2017.
http://www.guninetwork.org/articles/global-pressing-problems-and-sustainable-development-goals

Transformations to Achieve the SDGs, IIASA, 2018. http://www.iiasa.ac.at/web/home/research/twi/TWI2050_Report_web-071718.pdf

Part One
The Main Issues

World Population
Global Economics
International Relations
World Society
Politics and Power
Ecosystems
Climate Change
Global Public Health
Emerging Technologies
Disasters and Existential Risks

World Population

Things that may interest you

- In 1950 the world's population was 2.5bn. Some experts calculate such a population to amount to Earth's maximum natural carrying capacity. Since then the population has tripled.
- Earth's population grows by about 83m per year – more than the population of Britain (65m).
- A rise in fertility of just one quarter of a child per family in Africa yields a population increase by 2100 of 600m people.
- Infanticide in China, due to the one-child policy of past decades, means that China now has 106 males per 100 females. In many Chinese cities, 20% of women in their thirties are single and won't have children, being busy supporting parents and working long hours. So China has a shortage of mothers and its population will not grow further.
- 46% of the world's population lives in nations where the birth rate is lower than replacement rate – such as in Europe, China, USA, Brazil, Russia, Japan and South Korea. The main ways out of economic decline in these countries are immigration or automation.

If we could identify one overriding driver of change it would be population growth. It increases economic growth, ecological impacts, urbanisation, climate change, social stresses and the pace of technological change. Rapid population growth, beginning in Europe two centuries ago, spread worldwide by the 1950s, and now it is concentrated in Africa, India and parts of Asia.

Demography can easily be reduced to bland statistics, but for each unit of humanity there is a real person experiencing life's ups and downs, with brains, love in their hearts, a life-story to tell, aptitudes, skills and a spark of human spirit. In recent decades Earth's body count has skyrocketed but the volume and contrast of collective human experience, if we could quantify it, has probably jumped geometrically. Even the few remaining undiscovered Amazonian tribes are impacted: one anthropologist tells of a tribe using printed circuitry from a crashed airplane as jewellery.

While the *rate* of population increase has declined since the 1970s (peaking 1955-1975), population is still increasing, numbers have more than doubled, and total population still rises faster than back then. More people are living longer too: in 2015, 12% or 900m people were aged over 60, and by 2050 it will be 25% or 2.1bn (the same as the total world population around 1930).

Population is expected to level out between the 2040s and 2100 (estimates vary), thanks to contraception, women's changing priorities, people's busy lives and, associated with urbanisation and education, the rising costs of raising children and the declining benefits of large families.

Underlying all this is a change of heart: fulfilment, progress and meaning-in-life now increasingly matter to people. This reflects a generational change: one-third of the world's population is made up of Millennials (born roughly 1984-2005), 37% of them in India and China. They want fewer children and to have children later in life. More people than ever before will have no children. The eventual demographic downturn will have marked emotional consequences for the world – fewer children, smaller families, more old people and more social isolation.

In SE Asia and Latin America family size dropped from six to two children in the forty years up to 2008. The timing of a similar decline in Africa and countries such as India, Pakistan and Indonesia
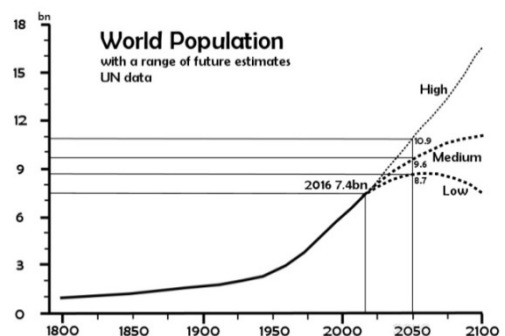
will depend on economic growth, fair living conditions and reduced insecurity. The end of world population growth depends on the speed with which birth rates in these countries decline.

The demographic transition

Here we come to the *demographic transition*. When conditions are right – decent governance, law and order, jobs, fairness – population growth stimulates economic growth and development. In its early stages, death rates fall while birth rates remain high, and labour supply is boosted for a generation as children grow up, move to cities and find jobs – think of the 1980s-90s Asian tiger economies. Then the birth rate sinks and the proportion of productive people, freed from parenting, increases. Women enter paid work and children grow up better fed and educated. As prosperity rises, the bulge population, now in middle age, consumes more and amasses pensions, investments and property. This economic virtuous cycle turns developing into middle-income countries. This is called the *demographic dividend*.

But then growth slows as the boom generation grows older, less productive and more dependent on a diminishing number of younger people to support them by working and paying taxes. This is the situation today in richer countries and in countries like China, Korea, Russia and Brazil. Life expectancy, pensioners and the years children spend in education all increase, and more is spent on social support, healthcare and pensions – this is the *demographic burden*. It can be offset by immigration, automation and creating conditions where dependents can be more active and productive (such as grandparents looking after grandchildren).

Barring mishaps, today's high population-growth countries will become stronger around mid-century, since their population bulges will be peaking and their economies maturing. But these countries have a new problem: modern medicine has brought on more ageing people before national GDP has risen significantly, so dependency grows in societies that are unready to carry it, and this erodes the demographic dividend. Thus, Earth has an ageing issue. Add in the sheer quantity of other, wider questions ahead, outlined in this report, and there's a sizeable challenge emerging.

Sustainability

Then there is the small matter of *sustainability*. Sustainability is here determined by four main factors: population size, the scale of global consumption, the efficiency by which economies use resources, and Earth's biocapacity to support all this. At present, population and consumption are still rising significantly; resource use efficiency is improving slightly but is still excessive and wasteful; and biocapacity is crucially declining, with new evidence suggesting a sharper deterioration than most people appreciate.

The world is consuming the equivalent of 1.6 Earths – our *global footprint* is in overshoot. USA uses up the equivalent of 4.8 Earths, countries like UK and Japan use 2.9, China 2.0, Brazil 1.8 and India 0.7. Poorer people have more sustainable consumption patterns than richer people, though many of them might justifiably feel dissatisfied with this since richer people have more than they do, and the poor pay a big price for that.

Unless catastrophes happen – with pandemics, nuclear or biological warfare or mass tragedy wiping out billions of people – world population decline awaits the 22nd Century. Unless humanity radically changes its environmental behaviour, biocapacity will not rise to meet the population and consumption growth we are seeing today. There is a problem.

This leaves two main alternatives: cutting consumption and raising resource-use efficiency. Overall consumption needs to fall, particularly for the richer third of humanity, most of whom will not be happy about that. Socio-economic inequality needs to sink so that scarcer resources are spread more evenly and fairly – remember, the richer half depends on the poorer half to grow its food, make its

clothes and clean its toilets, so this is important. Fairness means not only pulling poorer people up, but also bringing richer people down – reducing extremes of wealth, poverty and power.

Efficiency, meanwhile, means not only technological efficiencies such as automation, robots and artificial intelligence. It means wasting less, recycling, re-using and repairing more, using simpler systems and designing out waste, keeping to essentials, and improving ecosystems and natural processes so that biocapacity rises. We need to grow more food and improve the environment at the same time – that's a tricky combination. Efficiency is hampered by ecological degradation, pollution, resource exhaustion, soil depletion, habitat destruction, biodiversity loss and systems complexity. The story is not good. This equation doesn't square up.

So population demographics affect everything else. Add to this an unscientific, commonsense reminder: we humans are not just units of production and consumption who can be moved around at will and easily imposed upon. There's the matter of human contentment, and this crucially affects the politics of the future.

If people feel okay, public consent and cooperation, pluralism, tolerance and dialogue, public health, mental health and many other issues generally improve, while social stress, waste, violence, war, overconsumption and environmental damage generally fall. We are therefore not just talking about straight population numbers but also about subjective life-quality issues too – *happiness*. It concerns our psychology and feelings, not just our material circumstances.

Research in developed countries has shown that, once a person's income rises above a certain moderate level, reported happiness does not increase significantly as income rises further. So there is an optimum level of prosperity, difficult to define and different for different people, but many of us are over it while many more are under it. This century, the richer half of humanity will need to learn what *having enough* means, otherwise hunger and shortage will become endemic for the poorer half, and the richer half will have to rest easy with such a tragedy.

It is conceivable for ten billion people to live on this planet but, to do so, a lot needs to change, particularly with reduction of consumption and inequality, buildup of ecological capital, increased basic contentment and good international relations. It would involve a lot of change and hard work – a new approach to everything. Without this, life on Earth could become difficult, dystopian and dispiriting, even for the privileged, with a lot of conflict and tension, starvation, undernourishment and tragedy. Richer countries will not be exempt and will probably not be as prosperous and stable as they once were. Migrant numbers could grow into tens of millions.

Population and Earth's carrying capacity are thus vital issues in coming times.

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Global Economics

Things that may interest you

- Global debt is $164 trillion – 225% of global GDP. Humanity is irredeemably over-indebted.
- Government insolvency could be a serious issue in various countries – including affluent ones.
- Economic unions could form in Latin America, the Middle East, West and East Africa, South and SE Asia, due to national insolvency and a need for continent-scale collaboration.
- 10% of the world's companies generate 80% of all corporate profits. Large firms with more than $1bn in annual revenue account for 60% of all global corporate revenues.
- Distributed manufacturing (3D printing, nanotech, *etc.*) will significantly reduce the volume of freight and physical trade by the 2030s, affecting all economies and ending the concentration of production in areas richer in resources, industrial power and skilled labour.
- Cyber sabotage has a very real capacity to undermine the world economic system, its dangers arising as much from isolated brainy teenagers as from organised groups pushing an agenda.
- A world trading currency or a basket of pegged currencies could be closer than we believe.

The picture for the coming decades involves the convergence of quite a large number of important historic trends, and we'll review them here.

- *World economic power has tilted east toward Asia*, particularly its two rising superpowers, China and India. It has moved south from the richer north, with regional economies such as Turkey, Indonesia and Brazil growing in weight. With rising wealth comes geopolitical influence: the world's game-plan is increasingly set by the 'developing' world of five to six billion people. Economies developing less are the richest (top billion) and poorest (bottom billion) countries.

- *To a degree economics follows demographics.* Countries with rising, younger and urbanising populations generally experience rapid economic growth (the demographic dividend). However, growth bypasses the bottom billion people, hampered by war, drought, bad politics, corruption and disadvantage. In richer economies the population is largely stable and ageing, leading to sinking dynamism (the demographic burden) – affluent countries, with 15% of world population, are likely to shrink from a 54% in 2010 to a 30ish% share of the world economy by 2050. Middle-income economies will rise economically and mature demographically, levelling out around mid-century – including China, SE Asia, Turkey, Argentina, Brazil, Iran, Mexico and South Africa. Economies with high birth rates and relative underdevelopment, including Nigeria, Pakistan, the Philippines, Kenya, Tanzania, Angola, Ethiopia and Bangladesh, might rise to prominence later on. Between now and 2050 the fastest economic growth will be in Africa.

- *Women's economic role and influence is growing globally.* The frontline is now everywhere and the momentum of change is unstoppable, even though in parts it still lags behind. Watch Africa and the Middle East, two barometer regions for women's influence in society and politics. This concerns an accelerating shift of values toward economic justice, universal education and healthcare, sustainability and peace. Many men care about these issues but women have given it priority and emphasis. Women's views and influence increasingly permeate societies and this historic trend will continue. However, one critical change is pending: developments of the last fifty years have helped women as individuals, but a feminine influence that changes the nature of world society as a whole is yet to come.

- *Global economic growth and high consumption levels do not square with the ecological and resource limitations we face.* Defining moments are sure to arise when this misfit goes critical. It

could mean economic crunch-times and contraction, especially in richer, high-consumption countries. Many causes of this issue are systemic, and systems complexity, resource scarcity, declining financial yields, high debt levels, market instability and conflict proliferation will force systemic change. This comes at the same time as economic, environmental, resource and social costs are rising. Increased investment in mitigation, remedial and defensive spending in such spheres as renewable energy, city-redesign, social, ecological and climatic issues will be needed. Many economists assume global economic growth of 3% per year up to 2050, but this could be optimistic – it could be lower, zero or negative, affecting our capacity to deal with situations that arise between now and then. In the richer world, real-economy growth is already low: since 1980ish its growth has been generated largely through *financialisation* – banking and making money out of money itself – not in the real economy.

- *Humanity's economic and resource-consumption footprint is a decisive factor*, especially in richer and middle-income countries. Regional climate change, resource shortage, food insecurity, mass migration, public health issues and political rights will rise higher up the world economic agenda. Environmentally-based economic strategies that re-price commodities and business to account for their full human and ecological costs could become a key mechanism in adjusting consumption to the planet's carrying capacity. No one likes higher prices, but higher prices will come anyway.

- *Natural and man-made disasters will affect all countries*, leading in places to damage, instability, emigration, conflict, downturn, failed nations, food insecurity and added expense. Disasters hit affluent economies too, not just directly but indirectly, exposing insurance, debt and supply-chain vulnerabilities. In middle-income and poorer countries disasters undermine economic vigour, making revival, rebuilding and social improvement difficult. Simultaneous multiple disasters are a danger. Raising the world's capacity to absorb such shocks is a priority – this involves rescue and reconstruction mechanisms, setting aside financial contingency reserves, strengthening infrastructure and increasing social, ecological and systems resilience.

- *Economic crises and downturns could increase in scale or regularity* unless strong measures are taken to reduce debt and financialisation levels, break down 'too big to fail' companies, improve government and corporate contingency reserves and address other system-critical issues. The outcome will depend on the boldness of reformers, resistance from vested interests and the willingness of ordinary people to undergo economic change. The undermining effect of offshore banking, organised crime and corruption are key issues. Failure in reform can lead to periods of negative economic growth, disruption, food shortage, supply-line problems, cross-border payments breakdowns and other complex consequences. Crucial here is a need to redefine money, anchoring it to real energy, resources, natural capital and ecosystem services.

- *Anti-globalisation trends in USA and Europe will likely subside* as the costs of economic nationalism come clearer, as the economic influence of the global South rises further and as world problems demand increased international cooperation. Nevertheless, globalisation trends peaked by 2008 and will reduce somewhat: distributed manufacturing, regulation, instability, sinking consumption, escalating costs in cheap-labour countries, automation in high-cost economies and downsizing of physical trade will increase localised production, yet global interdependency is unlikely to decline fundamentally, more to change in extent and character. Profit maximisation and economic growth will decrease as key drivers of globalisation, while social-cultural, environmental and geopolitical cooperation will increase. Globalisation's future depends on political choices made, but upcoming nations tend to favour it while some developed nations have their doubts. Global integration is unlikely to wind down because a Euro-American minority says so, but its style and pace will change.

- *Financial war.* American dollar dominance in world trade is becoming outdated. USA's application of sanctions, financial instruments, trade barriers and military threats hastens the

process. Applied first against Iran, Russia, Venezuela and North Korea, then to USA's own allies, the result will be that the world gradually insulates itself against USA, building countermeasures. This will take the form of non-dollar (Yuan and Euro) international trade, institution-building (such as the Shanghai Cooperation Council) and trade shifts. Though USA acts muscularly it is vulnerable since its high debt levels (government debt of 104% of GDP and private debt of 75% of GDP) are propped up by investment from China, Europe, the Gulf States and the rest of the world. Dollar value is maintained by being used as the world's primary trading currency, though the Yuan and Euro can fulfil this role and a choice of currencies is preferred by most countries. This is heading toward crisis where financial war most harms the nation waging it. Momentum is accelerating toward establishing a transnational trading currency, probably in conjunction with the formal integration into the world economy of the offshore sector, currently the platform for one-third of all international transactions.

- *Inequality*. This is system-critical, not solely a moral or economic justice issue. Extremes of inequality lead to stagnation of crucial elements of the real economy – small businesses, social provisions, infrastructure, labour skills and social cohesion. Child mortality, disaffection, crime and corruption rise, and public health, social wellbeing and ecosystem care fall. When returns on capital exceed real-economy growth, wealth concentrates in ever fewer hands, social mobility declines and the rich increasingly form an impenetrable oligarchy. Money shifts from real to financialised and offshore economies, weakening real economies and making them susceptible to instability if the financialised economy fails. The gap between rich and poor widens unless redistributive policies and philanthropic actions counteract it – redistribution means richer people levelling down as well as poorer people levelling up. If inequality fails to be corrected, then multiple problems will ensue, ultimately affecting the rich too.

- *Poverty*. People are deemed extremely poor if they earn less than $1.90 per day, and moderately poor on less than $3.10 (adjusted for local prices), while the 'non-poor' earn over $10 per day. Some of the poor have non-monetary support systems (smallholdings, families, aid, *etc*), while many face big health, education and transport costs, with food taking up much of their income. People living above the poverty line still experience poverty – over 3bn people live on less than $2.50 per day. But poverty is reducing: people in extreme poverty have declined from 84% in 1820 to 55% in 1950, to around 10% in 2015. Numbers have declined but they still number around one billion, 50% of them in India and China and 85% in just twenty countries. Poverty will continue declining unless other factors kick in, such as climate change, soil degradation, food and resource prices and slowing economic growth. Whatever the statistics, poverty is difficult to live with and, for the rest of us, a cause for shame.

- *The offshore sector*. Reintegrating the offshore and shadow economies into the real economy is a core global issue. Offshoring provides a genuinely global investment and transaction platform transcending nations, but for this to benefit the world, regulation and taxation of cross-border transactions and offshore banking centres (a 'Tobin tax') needs to be introduced. This requires global institutions with powers to enforce compliance, which brings up sovereignty implications. The global economy has thus far been controlled by dominant nations – USA, Europe and Japan – but this dominance is receding. One third of international transactions happen offshore, so reintegrating the offshore economy is vital. With London's central position in the offshore economy, London could become the executor of this process, since many offshore centres are under British auspices – Brexit was engineered and financed by offshore interests.

- *Automation, artificial intelligence and distributed manufacturing (3D-printing) could change everything*, for better and for worse. They will cause a restructuring of real economies, rendering people and customary production processes increasingly redundant and making earned wages and salaries a thing of the past for many people. Automation can solve many problems in ageing societies with a demographic burden, yet it creates problems in developing economies where a growing population needs gainful employment. An uncontrolled race to automate is unlikely to

be constrained by concerns for its overall social and economic impacts. The ramifications are large and complex, and complications and social unrest are foreseeable. Also, digital networks are insecure and liable to critical breakdown, making these technologies vulnerable.

- *Resource shortages will impact increasingly*, bringing rising prices, market spikes and times of limited resource availability. This concerns food, energy, critical minerals, viable farmland, clean water, forest products, pollinator insects, fish stocks and ecosystem service-providing forests and wildlands, clean air and, in places, space. Scarcity and downturn – and how societies respond – could be predominant themes in coming decades.

- *There is a probability of fundamental systems change prompted by economic crises*, brought about through financial market failures, clusters of disasters, geopolitical shifts and tensions, uncontrollable migration, resource scarcity, government or corporate insolvency, regional ecological collapses, unforeseen events and combinations of these. Lessons from 2008 have not been fully learned, and this makes future financial crises more likely. Perhaps the world needs to be shocked into such changes but the necessary financial resources to invest in contingencies and critical issues will not be as plenteously available as they were earlier.

Global systems restructuring

To maintain market confidence and stability, many of the above questions are studiously avoided. Large-scale investment is needed in infrastructure, financial provisions and facilities to mitigate emerging trends which, if ignored, will lead to increased costs and losses. But such investment will yield mostly slow, indirect returns. There could be difficult decades before benefits percolate through. These will come in the shape of circumstantial paybacks, improved conditions and saved costs more than in direct financial returns, though there will be returns in resilience-building lines of business, though not at the profit levels we've known in the past. Times of faltering economic growth could demand sacrifices that few prefer to make – tax, price and regulation increases, systemic restructuring and falling consumption. Economic growth might no longer serve as the glue holding societies together.

While overall global growth may be sluggish, on the whole today's developing economies will grow stronger while richer economies will contract, relative to each other. A key area to watch is Eurasia: the Chinese Belt and Road strategy will put places like Kazakhstan, Siberia, Pakistan, Iran, the Caucasus and Iraq close to the centre of Eurasian economic activity. The Eurasian axis binding China, Central Asia, the Middle East, Russia and Europe will become the world's main economic axis. If India joins, this axis will channel 40-50% of world physical trade.

The most fundamental economic issue for future decades is systemic reform – not only of rules, practices and institutions but also of mindsets. It concerns the nature of societies, their psychosocial, economic, environmental and climatic resilience, and the very way the world operates, either through cooperation or competition. The sustainability that governments and businesses talk about is a form of tweaked competition – same economic fundamentals, with adjusted details and burgeoning regulation. This is questionable, an evasion of the main question.

A more cooperative, systems-aware, humane and nature-friendly approach is needed, based on economic justice, fairer distribution of resources and wealth, recognition of natural capital and financial capital as equally important, and transitioning toward a circular economy. This pitches two paradigms against each other: a social-ecological-systemic view concerned with longer-term, wider, global, human-friendly and environmentally-compatible priorities, or a short-termist, nationalist, business-oriented and military-industrial view, pushed by private, national, sectoral and vested interests. This friction will grow sharper in the 2020s and 2030s as the Millennial generation reaches middle age, eroding the older, nation-state based, top-down pattern of world power and economics to which older generations are accustomed.

To some extent there is also a race between technological change and economic development trends, and the impacts of ecological, climatic, resource and population-related trends. The hegemony of economic interests and power thus far dominating the world is likely to retreat in the face of a new viewpoint that sees the world more in whole-systems terms. This represents not just a generational shift of values but also a new analysis of the world situation, defined particularly by the need to deal with crises. A clock is ticking and the growing intensity of world events is unlikely to permit delay.

Circular economics

A circular economy is becoming a new focus for systemic change. By some observers' definition we have already passed *peak stuff*, now entering an era of increased pragmatic sharing, recycling and resource-use efficiency. In a circular economy renewable materials are used and non-renewables are intensely recycled, re-used and repaired – waste is an unnecessary cost, a loss of materials from the system at a time when materials are becoming scarcer.

A circular economy supports natural capital by reducing non-renewable exploitation, improving ecosystem management and reorganising human living, working, business, production and leisure systems. It optimises resource yields by designing products for re-circulation, sharing and built-in longer lifecycles. It encourages systemic efficiency by designing out pollution, emissions, toxic, socially damaging and environmentally depleting materials by reorganising the systems that create these problems. It is thorough and all-round in approach, rearranging everything to achieve optimum benefit with reduced inputs. Civilisation uses less and achieves more.

This demands a period of transition, already in its early stages and further developing in the 2020s-30s, focusing on reducing resource demand, switching to renewable energy, durable products, recycling, re-use and repair, replacing hazardous materials and generally increasing efficiency and benefit. Money will be earned from subscriptions more than sales, design more than hardware, outcomes more than hours laboured, and needs served more than quantities consumed.

Values of simplicity and economy are central to this, shifting the focus toward collective wellbeing and mutual benefit. It reflects a generational shift of values and a tilting of cultural gravity from the West to Asia. New generations believe more in *enough*, not *more*, in functionality, not ownership, and this is the psychosocial ground for an emerging circular economy.

It represents a new economic psychology and the start of a global economy that clashes and grates much less with the natural environment and with human nature than the inflated throw-away system we now live in. The priorities of the economy and the ecosystem would move toward convergence, especially when a point is reached where there is no alternative but to do so. Whether and how we achieve this transition politically and in terms of social consent is as yet unknown, but economic circularity represents a direction to head in. Ultimately change happens because older people die off and younger people take over.

Summing up

The days of high growth and plenty that richer economies have seen since the 1950s are winding down, since they are based upon amphetamine economics, over-consumption, resource over-exploitation and inequality. Human consent to maintain this cranked-up economic intensity is weakening as the generations change. The costs of mitigating the world's problems are rising.

Systemic reform is due. It was due in the 1970s but instead we saw the rise of deregulated, financialised and pumped-up economics from the 1980s onwards. Based on neoliberal norms, this proved regrettable when the 2008 banking crisis came along – and, reforms following the crisis being weak, we will see further crises of a similar kind. Systemic reform could have started around 1990 with the end of the Cold War, the integration of China and the former Soviet bloc into the

world economy, the rise of the internet and the ascendancy of new environmental and human values. The price of tardiness in systemic reform will rise to a point where the costs of delay outweigh its perceived benefits. Economic crises will be the mechanism forcing systemic reform.

Such reform will involve several decades of transition toward a more sustainable world economy. Key to this is a re-pricing of commodities to reflect their true costs and a large reduction of debt levels. Market failures will force the issue. Other key issues are legislation and shifts of public consensus and behaviour. The depth of this transition is profound, yet also sensible and overdue.

In coming times we face a choice. The global economy will be more integrated, with a world trading currency and further development of transnational economic institutions, regulation and sovereignty-pooling, transitioning toward a more sustainable, circular economy – more like a social enterprise than a profit-seeking corporate entity. Alternatively, world GDP will deflate, protectionism, competition, insecurity, conflict and crisis could grow and wider issues affecting the world economy could fail to be properly addressed.

Each option will have costs and benefits, but the reform option is more likely to succeed with ecological, climatic, population and social issues than the latter. These, in the end, are the major longterm determinants of the state of the world economy. Put simply, it all concerns mutuality or self-interest.

Interesting links

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International Relations

Things that may interest you

- The breakup of several countries is conceivable. Some might split, merge or be taken over, by agreement, conflict or necessity. Nations' legitimacy and viability is becoming an issue.

- Warfare is shifting from armies to freelance contractors, militias, special, robotic and cyber forces, eroding nations' traditional military relevance. Conflicts will arise over spheres of influence, water, resources and supply-lines more than territory. Unless peace dawns.

- Apart from powers such as China, India, USA and possibly Europe and Russia, geopolitical dynamos by 2050 might well be Indonesia, Brazil, Mexico, Nigeria, Kenya, Turkey, Egypt, the Philippines, Colombia, Iran and Vietnam, all with significant populations and economies.

- Future politics is less about right and left and more about openness or resistance to change – to some extent a worldview struggle. Though openness is also inconsistent and preferential.

- Technological, ecological, social and cultural soft-power will likely override economics and military hard power as deciding factors in the geopolitical sphere by the 2030s-40s.

Today a multiplicity of issues is in ferment, unearthing geopolitical vulnerabilities that could lead the world into a complex, debilitating and confused morass of issues later on unless dealt with soon. We have not fully recovered from Cold War bipolarity: when the USSR collapsed, the world slotted into an American-led holding pattern, but the overall trend now is to move away from superpower primacy toward regional powers, alliances and, perhaps before long, political unions. When USA stumbled around 2008, a proliferation of emergent events posed the question, *who now calls the shots?* More has been uncorked than first was understood and it will take decades to iron out.

- *First*, relationships are changing between rising and declining superpowers, all nuclear armed. Relatively, in terms of fundamentals, USA, Russia, Europe and Japan are subsiding and China and India are rising. This reorientates international relations, affecting many interdependencies and alliances. In particular, the distancing of Europe, Asia and Latin America from USA and the growth of Chinese influence is fundamentally rearranging the global landscape.

- *Second*, regional powers are vying for influence in their own areas (for example, Iran, Saudi Arabia and Turkey in the Middle East) in the relative vacuum created, creating a new middle level of global power and counterbalancing the influence of great powers.

- *Third*, frictions are simmering between some countries for a variety of localised and unresolved historic, resource- and population-related reasons – examples are Tajikistan and Uzbekistan, Egypt and Ethiopia, Colombia and Venezuela, or India and Pakistan.

- *Fourth*, independence movements and tensions are rising within nations – Kurdistan, Xinjiang, Palestine, Catalonia, California, Myanmar, Nigeria, UK, Mali and Yemen.

- *Fifth*, unease between smaller and bigger countries – such as between China and its neighbours over the South China Sea, or Russia and Ukraine, or USA and Mexico.

- *Sixth*, a weakness of transnational power highlights a need to upgrade the United Nations (particularly by removing the right of single powers to veto Security Council actions).

- *Seventh*, pressing global problems concerning climate and the environment, the Persian Gulf, the Arctic, trading rules, the orbits of bigger powers, governance in Africa and power shifts in the Middle East are acting as stressors in international relations.

Altogether, this is a mighty and complex fermentation. The danger is that the world lapses into a confusion of tensions, diverting attention from the bigger transnational issues at hand. It presents a

profound option to avoid resorting to conflict or stand-off and to do things differently, avoiding a global slide into a plethora of complex, drawn-out geopolitical situations.

Global power

Geopolitically, nationally and locally, the key question is: *who decides?* Domestic politics are ever more subject to volatile bursts of public opinion, some pertinent and inspired, some venting frustration, some manipulated by the media or by political or military interests. These symptomise an underlying socio-political tension, bringing a risk of chaos and also a potential for change. Governments of all shades – democratic, authoritarian, populist, military and dictatorial – face legitimacy, consent and delivery problems. Little is clear-cut and simple any more.

This shifts the geopolitical tectonic plates. The global reach of former great powers is narrowing, and each power is becoming responsible for its own patch – for example, USA has lost traction in the Middle East which, being in Russia's 'near abroad', makes Russia a new arbiter in the region. China is becoming the minder for East Asian affairs, and India, Pakistan and Iran for Afghanistan.

A problem with international relations is that they lie beyond public influence – the agenda is determined over people's heads, behind closed doors, lacking democratic oversight and often dominated by military-industrial, intelligence, business and background interests. This leads to outcomes that are not necessarily best for humanity as a whole. At the UN, the Security Council five permanent members (P5), chosen back in the late 1940s, make the big decisions while the General Assembly of all nations is limited in influence – though it could assert itself more than it does. World power is likely however to broaden over time, with marginal increases in accountability, and the action of lesser nations in concert could force the issue – though this has complications since countries have different and varying needs and allegiances.

This brings up the question of subsidiarity: *should national sovereignty or global governance be the foundation of world power?* National self-determination is important but if it holds back the world or jeopardises other countries, or if rulers break international agreements or judgements, or oppress their people in ways that affect or disgust other nations, should the international community be able to impose its standards and will? Military interventions are now less acceptable, sustainable, affordable or conclusive. How should the international community form a consensus, to avoid domination by the big powers, the P5 or vested interests? Few countries dare broach such questions, yet bold world-sized decisions will be needed – the success or failure of the international system rests on these. A failure could be catastrophic.

By osmosis and on a *de facto* basis, power is devolving both upwards toward the global level and downwards toward more local, provincial levels – nation states are becoming more marginalised as legitimate seats of power. This shows particularly in the EU, where the regions need greater autonomy, yet four levels of governance – local, regional, national and European – are too many, and the traditional nation states need to give way to the evolution of a three-level 'Hundred Region Europe' to correct democratic deficits. But vested interests in bigger nations are strong.

Today's movements for ethnic and regional autonomy are significant since the rather draconian geopolitical changes needed this century require consent, support and input at street level and need to serve local needs. Democratic deficits and power imbalances need repair. While power surreptitiously devolves up and down, nations' tendency to avoid acknowledging newly-developing power arrangements is leading to the possibility of an avalanche of events in which a rapid geopolitical rearrangement becomes imperative, whether by design or by accident. Old patterns of national sovereignty, exceptionalism and non-compliance are becoming obsolete and obstructive faster than nations are happy to admit or adjust to.

A dangerous gulf yawns between national, short-term, narrower interests and wider, transnational, longterm priorities. Each country is variously confused over its priorities: short-termist national self-interest still prevails but the longer-term precedence of transnational priorities is escalating.

This gap opens up over key issues such as climate change, the law of the sea or of space, migration, the Arctic and Antarctic, or spheres of influence, and it will grow bigger. Nations' best interests are shifting toward conforming with global priorities – the price of not doing so is rising.

Bridging this gulf involves revitalising the UN, its constitution and powers, and UN reform is a critical issue. As things stand, the UN cannot finance itself, act autonomously, override sovereign national interests or even reform itself without individual nations' instigation and agreement. Without reform, by default the world becomes guilty of terrible derelictions of duty that we see regularly in the news today. If this problem is left until an emergency arises, there is a danger that the pooling of national sovereignties to build a new, collaborative transnational order is poorly considered, forced, piecemeal or skewed.

Nations

One further global vulnerability is the underlying dysfunctionality of many nations. Regional and metropolitan power, movements seeking autonomy or independence, problems of governmental legitimacy, delivery and representativeness, and the expanding role of online social networking, transnational NGOs, non-state actors, migration, trade and other boundary-crossing issues all eat away at national authority. Arguably this applies to around half of the world's nations. Those with elites that assert national unity most strongly are well worth looking at – drummed-in patriotism is in a way a sign of weakness in national identity and legitimacy.

With the upward and downward power shift mentioned earlier, many nations' relevance is not yet a critical issue but it is likely to become so, perhaps in the 2020s-30s, when rapid implementation of urgent global measures becomes pressing or when democratic deficits and legitimacy emerge as volcanic public issues. Today's international system is dogged by its past: maybe it is a system unfit for purpose in the 21st Century.

Many nations do have an emotional or identity-based relevance to their inhabitants, but this is weakening in favour of regional or metropolitan allegiances and organisational realities. Formed by conflict, conquest, colonialism, marriage, elite manoeuvring, treaties and quirks of history, many nations are there simply because they are there. Socio-economic changes are bypassing customary power structures and we now approach a critical stage. The international system stumbles toward a reluctant redesign, developing a need to rearrange jurisdictions and to adjust to emerging *de facto* realities. This can threaten national elites, some social sectors and older generations, arousing sticky and complex tensions, trust and identity issues, yet it is unlikely to go away because of that.

Meanwhile, there is the matter of war. Warfare obstructs progress in most important issues. While explosions, damage and atrocities take place, international cooperation is weakened, humane values and sensitivities are hardened and nations feel insecure and defensive. But war, except for the narrow interests who gain from it, is slowly losing its value as a means of handling tensions. Soft power is gaining traction, particularly because of trade relations, and through the game-changing agency of China with its geopolitical strategy of persuasion and economic dependency-building.

Relative to world population size, human losses in conflict are declining significantly – though, over the last century, deaths and injuries have shifted disastrously from mainly combatants to mainly non-combatant civilians. Meanwhile environmental, trade and infrastructural losses are escalating. As yet the UN has insufficient teeth to prevent conflicts and the onus rests on superpowers and regional powers to contain or stop them – and on the UN and the NGO sector to clean up the mess. Military methods clash with other global pressures and priorities – climatic, environmental, humanitarian and economic – and conflict-reduction is now no more a moral ideal, more a pragmatic global functionality issue.

Democracy and Social Control

We stand on the threshold of a weighty choice between the exercise of democratic people-power or high-tech, superintelligent mass-control systems run by unaccountable forces such as those in Silicon Valley. Democracy is preferable to most people, yet democratic maturity – a society's capacity over time to handle complex situations and make impartial, difficult decisions – is still weak. Government is an executive interface between the public and the powers-that-be – market-makers, financiers, oligarchs, establishment figures, moguls, mandarins and military-industrial interests. It tends to lean toward the powers that be, and democracy is limited to a periodic limited-choice vote that prevents the public from gaining true democratic experience. This deficit prepares the ground for technological control systems, over which the public feels it has little control.

Meanwhile, authoritarian control systems in which government and the powers-that-be are aligned, have their own shortfalls – it depends on who is in control, what their aims are, on their competence and whether they successfully maintain public acquiescence and read the times correctly. Instinctively people don't like mass-control systems, yet some authoritarian regimes do demonstrate that they can deliver results, think broadly, pursue longterm strategies and control the agenda – except, of course, when events overtake them. People-power meanwhile depends on social coherence, solidarity, maturity, pluralism, communication and a capacity to face big questions, achieve workable results and sometimes make sacrifices. The need to deal with large-scale problems thus tilts the world toward background control systems and authoritarian regimes.

The virtue and the curse of such control systems is that indeed they do control people and resources. This involves not just states but also corporations such as Alibaba, Tencent, Google, Amazon, Apple and Facebook, each of which generates so much money that they become significantly independent financial actors as well as controllers of data and artificial intelligence. We are creeping unwittingly toward a digital control system led by Silicon Valley, China, India, Russia and the 'Five Eyes' intelligence network (US, UK, Canada, Australia and NZ). Privacy, freedom and transparency are meanwhile issues that many people set aside for another day, and that day will come, probably in the 2020s-30s. Freedom is under threat, easily eroded, lost by public omission and commission. That loss is scooped up by algorithms and artificial intelligence. Ultimately the indifference or the consent of majorities will determine the direction of travel in this and many related arenas. The core issue is: *do people exist for the system* or *does the system exist for the people?* Does fear of chaos make us surrender to top-down control? How serious are we about freedom and democracy? Belatedly, these questions will rise up the agenda in coming decades.

Possible futures

If the world is to enter the 22nd Century in good shape, we need to look at the question of transition from a competitive toward a more cooperative model of global functioning, by resetting customary short-term self-interest to favour longterm human and environmental priorities. Unfolding events will oblige this and the urge to survive will increasingly drive it. There is also the tension of global-scale priorities and human-sized local concerns: how this contradiction plays out rests on unknowns such as the subjective decisions of leaderships and on social consent, acquiescence or resistance.

Geopolitics is by nature a large-scale issue, difficult for many people to encompass and participate in. But we are all involved and affected, and a number of geopolitical possibilities are worth contemplating since it helps us place the news we read into a wider context. Here is a review of foreseeable geopolitical scenarios for the coming decades:

> **Global integration.** Unfolding events, strained resources, failing states, cross-border challenges, and environmental and economic crises could force the world to integrate further, strengthening international law and compliance while instituting UN reform and making binding multilateral agreements. Intensifying events could push things this way since friction and diplomatic failure or

disintegration could be more painful. It would need good leadership, forward ideas and a few game-changing events to make it work, because globalisation has since 2008 lost much of its shine. Developing facts could oblige such a change, especially if the world economy deflates and climatic, environmental and other issues go critical. This would be an historic step.

Multipolarity. We are now in new territory: the relative subsidence of USA and the rise of China are reconfiguring things. Other nations might have to align with either power or with another grouping. A binary superpower system is conceivable, though the balance of power would not last long since the longterm fundamentals of China's and USA's positions will continue changing in China's favour. Such a binary polarisation is likely to cause other powers, including Europe and India, to step up, creating a multipolar great power configuration. Multipolarity creates a kind of order though it subordinates most nations' needs to the sway of big powers. A substitute for global governance, its value depends on powers' priorities and agendas. Yet it does reduce the variability and complexity of competing geopolitical priorities and claims. Global power-projection is now increasingly expensive and troublesome – USA is, after all, the world's biggest debtor nation – and the capacity of big countries to sustain such policing power in future is debateable. So a multipolar configuration would be the next best option, in a big-power context.

Trilateralism. By the 2030s, China, Russia, Europe, the Middle East and possibly India could form a Eurasian bloc; the Americas could form a bloc – though Latin America has an historic distrust of USA; and Africa, more populous and developed than now, could form a third bloc. The most likely is the Eurasian bloc: China's Belt and Road project is advancing, building powerful economic and institutional alternatives to the former Western-dominated order. It would make Eurasia the world's dominant bloc. This would prompt a response from countries that are not involved – they would either become orbital to or resistant to Eurasian dominance. Much depends on China's capacity to maintain its friendships and on USA's capacity to avoid losing its own. The big question affecting the world's future is whether these blocs would be competitive or collaborative and whether any rivalry were soft-power or military based.

Continental blocs. To disperse global superpower primacy and deal with dysfunctional nations and continent-wide challenges, new blocs or unions could arise in Latin America, MENA (Middle East and North Africa), SE Asia, Central Asia, Africa and South Asia, to complement China, USA, India and EU. It would represent a hard-headed response to multiple global challenges and to the insolvency or breakup of some states – poorer and indebted states and those experiencing legitimacy issues or domestic frictions. Such blocs could be constructive or problematic in balancing power, yet they are a logical solution and a way of creating a global balance of power.

Stalled Engines. There is a possibility of global downturn as major economic powers turn inward or lapse into wasteful superpower rivalry. Nations and regions retract into isolationism and trade and cooperation dwindle. Global issues remain stalemated or unaddressed. Conditions deteriorate, bringing about complex outcomes as the climate changes, food and supplies dwindle and insecurity and conflicts gain momentum. A global crisis resulting from this could lead to political corrosion and a sorry future, but also the experience of downturn and its consequences could later lead to a revival of international cooperation, configured differently from before.

Regions of order and chaos. Strong countries form coalitions to maintain trade and order and deal with those environmental, migration and conflict issues they're able to deal with, while letting uncontrollable areas drift. Megacity-regions could gain prominence as nodes of prosperity and order, even fortresses of stability. The poorest 'bottom billion' grows larger, some areas become zones of poverty or resistance and other areas come under criminal, militia, kleptocratic, political, religious, experimental or chaotic systems. Richer areas fend off threats from unstable regions while also depending on them for resources. Global issues struggle to progress. Trade and aid falter, migration and supply-line issues escalate. Environmental and economic conditions deteriorate, poverty and hardship increase and in some areas state organisation collapses. The world becomes harder, more unstable and cruel, with mounting problems that defy resolution.

Breakdown and conflict. The world degenerates into conflict and insecurity with some 'fortress' countries and alliances holding firm, while shifting and deteriorating conditions pertain across much of the world. China, Russia and Europe or other combinations could form alliances while the rest of the world is tumultuous. The global agenda is hijacked by conflict, smuggling, black markets, opportunism and chaos. Trade and international law disintegrate. Many people have to fend for themselves, leading to some successes and many tragedies. Later, faced with a downward spiral of events and a weariness with insecurity, some areas could pull together and a movement could grow by late century for urgent global cooperation and revival.

Networked world. A tech-driven cultural shift emerges in the 2020s-30s, reflecting the sharing, collectivist, circular-economy values of Millennials and the growing involvement of artificial intelligence. Megacities, corporations, NGOs, non-state actors, ethnic and social groups bypass increasingly dysfunctional nations, governments and institutions. They form networks of pooled interest, seeking to resolve pressing global issues by innovative, doable means and through relatively informal crowd-supported initiatives. While posing difficulties, this flexible hyper-structure forms the basis of a new global order which evolves over a few decades. Majorities join in or acquiesce since this configuration delivers the goods in ways that nations failed to do.

Potential game-changers

While the above scenarios outline future global possibilities, the progression of geopolitical trends could be affected by critical black swan events such as the following, some of which, for better or worse, could profoundly affect the way things go.

- *Conflict or nuclear war* breaks out between USA and China or India and China, or between smaller flashpoint states such as Israel, Pakistan, Iran or North Korea;

- *Serious economic, ecological or technological crises, or a pandemic or mass migrations* could exert a critical pattern-shifting effect on the geopolitical landscape;

- *Influential leaders promoting conflict*, competition for resources, national exceptionalism and deterioration in international relations make things difficult for everybody;

- *Influential leaders with game-changing ideas*, exemplary moral standards, integrity and popular appeal shift the agenda progressively, engaging support, mobilisation and change;

- *A bottom-up consensus for change*, sparked by critical situations, poignant events or geopolitical gridlock, could arise from an alliance of small-to-medium nations;

- *Disasters, or several in succession, could shock the world* into adopting fundamentally new strategies through multilateral diplomacy;

- *Computer hackers or non-state actors cause a systems breakdown* or strategically threaten key systems unless certain positive objectives are met – this could be positive or negative;

- *Popular movements, political landslides, revolutions, migrations or shifts of public opinion* cause a change of mindset and consensus, obliging progressive or regressive change;

- *Artificial intelligence, digital technologies and control systems* bring about far-reaching changes. The first to develop AI could gain an overwhelming advantage.

Whatever becomes the case, events in the 2020s and 2030s will decide what happens around mid-century. Global issues could turn critical, leaning toward breakdown, grinding complications or systemic change and revival. Or a shift of values and culture could change the geopolitical context, shifting the world agenda in a different direction from now. A clash of priorities between climatic-environmental-human issues and business-systemic-military interests lies before us. Critical to this will be the values and expressed choices of Millennials and particularly of women.

The current geopolitical framework of sovereign nations will come under test, prompted by relentlessly advancing trends in technology, development, political power, climatic, environmental and resource issues, disease, migration, demographic and economic change. At present, things could go in any direction. The coin is spinning in the air but the direction of travel might become clearer by the end of the 2020s or during the 2030s.

Much hangs around steps taken toward effective global-scale governance or cooperation, accompanied by a possible reorganisation of nations and local power. The alternative is some sort of breakdown and, on the whole, a difficult time planet-wide. The consent, participation and acquiescence of the public will be a critical factor, and an open question remains whether this is achieved through a ground-level public awareness and mobilisation or through a more coercive authoritarian system. Though issues such as nuclear arms, climate change, migration and pandemics are often noted as the top concerns for the coming time, socio-political developments could become even more critical than these.

Interesting links

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World Society

Things that may interest you

- Between 1980 and 2016 the world's richest 1% reaped 27% of the world's income while the bottom 50% of humanity collected 12%. Aside from the socio-economic inequalities involved, it is doubtful that human contentment was proportioned similarly.
- If global warming takes place as currently understood, 275m people in urban areas might need to move because of flood risk. That's equivalent to half of Europe moving.
- When the world's population starts sinking there will be more old than young people. Sounds obvious, but think about it: there's a certain poignant sadness to it.
- Corporate tax dodging costs poorer countries $100bn every year, enough to educate 124m unschooled children and prevent the deaths of 6m children with improved healthcare.
- The two least corrupt countries, Denmark and New Zealand, are only 90% clean. Such countries have the most press freedom and judicial independence. The more corruption, the more inequality. Corruption is a value-lost tax at 5% of global GDP, or $2.6tn per year.

As world population has grown, society has become strangely lonelier, more individualised. This initially European cultural pattern, related to capitalism, has now gone global. Customary social bonds have stretched apart through events, circumstances, migration, shifting social patterns and changing values. In many parts this megatrend is advanced and in other areas it is developing, bringing new freedoms, burdens, possibilities, problems and relationship structures.

The quantity of relationships has proliferated – far too many and far too few, for different people, at different times and in different contexts. Relationships are more numerous, single-purpose, conditional and unreliable than those formerly bonded by blood, community or shared history. The more crowds have proliferated, the more we've had to stand on our own two feet. Social isolation is increasing: in OECD countries, 6% of the population, and men more than women, report rarely or never spending social time with others.

Population growth brings immense sociological changes, complexification and diversification. Humanity is in the midst of a remarkable meeting-up through travel, migration, urbanisation, online networking, trade and tourism. Localities, ethnic and social subgroups are now globally connected, rubbing up against each other, with opportunities for interaction never met on such a scale before. So two big trends, one isolating and one connecting, are at work at the same time, irreversibly changing the character of societies everywhere.

Economic development brings changed relationship priorities and loosened social cohesion. In traditional societies, family and community generally come first, then the individual. In modern society, the individual comes first, then family, then community. The glue of human trust and allegiance is eroding, and a new equilibrium is yet to take shape.

When an economy rises, society declines, and when an economy declines, society rises. In good times, people are busy with jobs, business, acquisition and enjoyment, with less time for family and community life. In economic downturns a sense of mutuality and shared fate can grow stronger, with family and community growing in importance as social survival mechanisms.

Very often, migrants move to affluent countries to earn income to remit home to their kin: in 2015 remittances amounted to $582bn. In the richer yet socially poorer affluent world, inward migrants bring social enrichment and diversity while source countries lose many good people, weakening their societies and creaming off their brainier and more enterprising members. This reinforces the fundamentals of global inequality – not just economic, but inequality of safety, rights, freedoms,

opportunity and social protections – driving the increasing migration of today. On balance, developed countries profit more from the developing world than the latter gains from them. Globally, migration is thus an inequality-balancing factor.

Up to now, economic growth, at times approaching cult proportions, has been prioritised over social benefit and welfare. The world is run as a shareholder-driven corporation, not a public-interest foundation. This is problematic for nature and people. Governments, officially mediators between business and people, tilt toward business and economic growth. At a time when priorities are shifting from economic toward human and environmental priorities, this is problematic.

Growth has brought millions out of poverty and improved many people's lot, but at a social and environmental cost. To correct this, aspirations need to shift from growth to sufficiency and our lives need to simplify. Economic priorities have a socially destructive side and, unless greater focus is given to strengthening society, humanity risks becoming less governable, more unequal, restive, dissonant and competitive, ultimately undermining economic growth itself.

Social fragmentation

Attitudes to family loyalty, marriage and customary social duties are shifting. This distances younger people from their elders. Older and disabled people, growing in number, increasingly place a dependency burden on economically productive younger people. This exacerbates generation gaps, stresses and disconnects at a time when societies need to pull together.

Relationship gaps are widening, marriage is declining, families and communities are disintegrating. A new reintegration has begun, creating looser families bonded more by circumstance and less by blood or law, also more unstable and varied in membership and family roles. Birth rates are mostly falling but, while this reduces population growth, it increases emotional vacuums. Smaller families make for a more flexible labour force and movable population, though humans are not pawns: this nuclearisation charges a price since more and more people live alone or feel isolated.

In richer countries the old and disabled rely on pensions, savings, assets, benefits and care services more than on communities and families. In poorer countries, modern medicine, while extending lives, adds to family and community burdens, impacting particularly on women. In Africa, orphans are common; in Asia, children's parents move away from their families to work; and in big cities parents lose their children to screens, the street, gangs and schooling. There's a lot of social distancing going on.

"Before things changed, I went to the neighbours for help. Now I ring a helpline." This, from a former East German, highlights how economic growth and social splintering lead toward professionalisation of care, education and social services, eroding community relationships. Dependents become disengaged, passive support recipients. Large extended families, for millennia an efficient living format, are diminishing. Yet the need for family and tribe has not gone away.

Social trust is in a process of deconstruction and reformulation. Signs are visible in today's touchy sensitivities over safety, terrorism, online and sexual abuse, shootings, violence, immigration, gender and identity politics. Thresholds of acceptable behaviour are shifting, with new standards being hammered out through a sort of aversion therapy in which a multiplicity of social nightmares are testing our limits and boundaries. We have stumbled into a collective reactivity, vulnerability and anxiety: who are *we* and who are *they*? How much should we trust strangers, even neighbours? How much should we protect ourselves? Trust is one of today's big inflammatory issues.

Yet online social networking has created new links between dispersed diasporas, minorities, special interest groups, singles, silver surfers and young people everywhere. Online tribes and networks broaden horizons while also creating a contrary echo-chamber effect where people seek validation within their own peer-groups. But internet inadequately replaces the loyalties, support and sanctions

of traditional communities which, while imperfect, at least offered a container of knowns, shared experience, common values and fall-backs to give people a feeling of belonging.

Amidst this fermentation more appears to be dying than being reborn. But this depends on how we see things. We are becoming planetarised, with tribes, communities and families reformulating themselves – the world is transitional, and this will take generations. Environmental challenges will catalyse deep and wide societal changes, since adaptive resilience will require concerted effort. The privatised materialism separating people in the last century could by necessity morph into increased sharing, pooling and cooperation. A systems redesign is on the agenda.

How will humanity reformulate itself in its new context of squeezed global cohabitation? Three main mechanisms are visible. The first is a shift from below, driven by generational change, personal initiative, social movements and the NGO sector – most visible amongst Millennials, women, pressure groups and in movements for change. The second involves authoritarian, top-down social engineering, with Big Data, surveillance, automation and technocracy setting the rules. The third involves the catalytic effect on society of crisis, hardship and breakdown, forcing issues and obliging constructive response. Perhaps some combination of all three is likely.

Social change

Social change operates differently in different contexts. Maslow suggested that needs become motivators for change only when unsatisfied. He outlined five need levels: food, water and shelter; safe and secure homes and neighbourhoods; family and community belonging and support; social success, progress and respect; and realisation of our fuller potential and altruistic urges. Salaried, stable, middle-class people can aspire toward rights, tolerance and fulfilment, while people who do not know where the next meal comes from can at best aspire toward basic sufficiency and security.

So different societies see their next development stage differently. One effect of globalisation is that millions of people are becoming more aspirational, less happy to accept their customary lot. Their concerns become a development motivator: then, if a society is clamped in a framework of outdated norms, rules and institutions, pressure mounts for change. Modern revolutions start with agitation amongst mostly younger people for jobs, opportunity and rights, which come up against resistance and quickly develop into political pressure on ruling regimes.

In times of change the reservoir of social potential, particularly amongst young people and women, starts fermenting. When conditions are right this achieves critical mass, causing normally docile people to express their feelings in action or protest. What makes a change lift off or fail remains a mystery to this day. Ranging from local movements to big political uprisings, it gets ugly when power structures resist any loss of power or privilege. When resistance comes from authorities or elites, it is mainly a matter of whether popular movements can overcome it, but when it comes from ordinary people things are far more complicated, and a thorough cultural shift is needed. These take time, sometimes involving painful social divisions, even civil war.

Change breaks through when a minority's concerns engage the wider public's perceived hierarchy of needs, turning a remote idea into a charged issue that can move a mountain of apathy, habit or resistance. But full social change becomes genuinely embedded when its core ideas are passed down and normalised by the generation following. Real change happens when transmitted across generations, through education, family and community transmission.

Exile on Main Street

Migration is a hot topic that tests many nations. About 258m people lived outside their country of birth in 2017, up from 173m in 2000, and projected to be 405m by 2050. In 2009 there were 740m internal migrants (the most being in Colombia, with 7.6m). Some are forced to leave their homes by war, disaster, politics or climate change while others are voluntary migrants, mainly economics-

driven – but is migration due to poverty, decline or failed harvests constitute voluntary or forced? There is also migration from richer countries: 9m Americans and 5m British live overseas.

The biggest recipient countries are USA, Russia, Germany, Saudi Arabia, France and UK, and the biggest émigré countries are India, Mexico, Russia, China and Bangladesh. Turkey is the largest recipient of refugees (3.5m), with Uganda, Pakistan, Jordan, Lebanon and Pakistan also hosting large numbers. Many Palestinians have been living in refugee camps abroad since 1948, Eritreans and Ethiopians have been in Sudan since the mid-1960s and Afghans have been in Pakistan since the Soviet invasion of 1979. Migration is growing and here to stay.

Migration from country to city is a key aspect of global change. Today, thirty Indians move from country to city *every minute*. With urbanisation comes high population density, social complexity, creaking infrastructure, unaffordable or poorly-serviced housing, pollution, noise, slums and crowds. This takes a generation for migrants to adjust to, and there's no going back.

Nearly all global population growth takes place in cities. People living in big cities topped half of humankind around 2008 and by 2050 it will be around 70%. Rural populations are expected to *sink* by 600m by then: humanity is crowding together, partly by choice and partly as a result of land rights struggles, climate change, rural decline, poverty and changing aspirations. But urban life doesn't always fulfil people's needs for services, healthcare, education, work and stimulus. Modernity exaggerates disparities between urbanites and small-town or rural folk beset with relative poverty, deterioration and social conservatism: this creates a two-nation divide. A global schism has grown between those with cars and smartphones and those without.

One of the cruel side-effects of rapid development in the global South is that it is selective – it creams off those with the ability, education and determination to modernise from those who get left behind, and it most benefits the privileged. According to the World Bank, only 1.5% of the world's land generates 50% of global production, and of 2bn people in lagging areas, half live in left-behind rural areas and half in city slums. Rapid economic growth masks a problem: net growth is not equitably spread, offering high rewards to some and low rewards to many. Those blessed with advantage feel less obligated than before to help those in need and left behind, also feeling increasingly disconnected from their wider families or communities of origin.

Such schisms undermine pluralism and civil cohesion. Exaggerated inequality, corruption, crime, injustice and eroded social and workers' rights eat away at social trust. The rich and affluent grow remote from working majorities, who themselves are increasingly at odds with each other – class systems have changed. There are the rich, then the shrinking *salariat*, with regular work, salaries, pensions, holidays and benefits, and the *precariat*, with insecure work, no perks or benefits, many of them migrants or disadvantaged, or women, young or old people, many of these in jobs below their capacity or educational level, and mostly treated as supplicants. The greatest growth in numbers is amongst the rich and the precariat. Security is melting away.

The precariat divides three ways: *regretters*, or older, former skilled workers whose jobs have gone, with rustbelt backgrounds and often voting for populist politicians; *insecurists*, or migrants, short-contract workers, benefits claimants, rural people and others with few fallbacks and little political clout, whom leftist parties often fail to represent; and *progressives*, young, educated, global freelancers, startup entrepreneurs, activists and lifestylers, who are politically active outside normal political channels. Members of the salariat and the precariat have differing issues but both share a sense of declining traction and influence in a fast-changing world.

Hyperfermentation

Frustration with inequality, oligarchic impenetrability and systemic inertia squeezes deeper historic tensions closer to the surface. Bottled up, longstanding feelings of powerlessness, injustice or frustration can erupt when evocative trigger events occur in the public domain. Sometimes dramas then acted out are corrective and sometimes they lead to chaos or to clamp-downs, yet they express

deep and complex emergent dynamics. In coming decades these dramas' potency will be both a blessing because they can heal wounds and improve things, and a danger because they can be distracting and damaging. Much depends on the response of authorities: one of the main triggers of uprisings is authorities' repressive reactivity. Change could happen more smoothly.

Coming decades will see further social stresses – not the class wars or liberation struggles of the past but more multifaceted and contradictory dynamics. This rising fermentation can be interpreted as a fast-track, rather painful burn-up of historic demons, clearing the way for something new and different. But it can also be destructive, cruel and nihilistic. Humanity has agency: *we hang together* or *we hang separately*. The world approaches a moral choice point on this question.

Something else is also going on underneath. Modernity has catalysed a psycho-spiritual shift toward whole-systems thinking and a spiritedness not easily contained by established political, religious and cultural beliefs. The idea of *one world, one humanity* has grown over the decades. This isn't a straight and simple process – it threatens regimes and oligarchies and they resist – but over time there is net movement that way. There is validity in both sides of this tug of war, since one of humanity's key virtues is its variegatedness: if we merged into a sameness, much would be lost. But variety does not mean indulgence in distinction, discrimination, rivalry, hate or conflict.

If a majority consensus comes to a shared perception, it becomes an accepted given and things change. Recent research has suggested that if only 10% of the population asserts a perception whose time has come, a shift of consensus and a wider social change can occur. Around mid-century humanity could be tested in its capacity to rise above its differences: we might collectively be obliged to compute that our primary self-interest lies in mutual, shared interest. The embedded cynicism of our age tends to rule out such eventualities, but then, this is an age of black swans.

Hearts and minds

Complicated trends are at work. There is a generational divide, a gender rebalancing, a struggle to redefine social and tribal identities, a complexification and reshuffling of social subgroups, a reviving localism and regionalism, a new tribalism and a new global consumer culture. Pulling in different directions, these are very human responses to life in a changing world. This shifting might lead either to social fracturing or to a new sense of pluralistic social coherence.

Inertia and resistance amongst older people collides with impetus for change amongst younger people. In the majority world, many young people justifiably seek justice, peace, wellbeing, good governance and social cohesion as they struggle to create a new reality for themselves. Humanity is straining at the leash, unsure where to head but neither wishing to accept 'more of the same'.

Economics will always be important, but in future growth will increasingly be reckoned in ethical, social, cultural and ecological terms. The full psychosocial and environmental costs of everything need our attention because the price of not doing so will escalate. As global crises intensify, social engagement, equity and justice will become more critical – otherwise disaffection, pessimism and indifference could wax large, bringing serious consequences. Societies will succeed or fail in the way they cater for their deficiencies, vulnerabilities and weaker people. Without a semblance of commonality of purpose and effort, our capacity to face big challenges could be sorely constrained.

Human society pulls in a variety of directions and the endgame is unclear: we are in mid-process and a battle for the hearts and minds of humanity is in full swing. By 2050 the situation might have clarified somewhat. The world will be more transitional than today, though our sense of where we are heading might have come a little clearer. Some parts and social sectors will advance ahead of others, but a whole-systems approach rather than sectoral self-interest is needed.

Cultural leadership will have shifted from West to East and North to South. We will see a world more integrated and unified, even if under strain, or a world in jeopardy, strife and danger. Those

who determine this will not be Americans and Europeans. The future lies in the hands of those who, formerly, were their colonial subjects. That is, *the majority*.

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Politics and Power

Things that may interest you

- The number of democracies has grown since 1990 but voter turnout has declined, particularly in Europe – indicating shrinking perception of the extent to which democracy changes things.
- In 2015 4.1bn lived in democracies, 800m in managed democracies, 440m in oligarchies, 1.71bn in autocracies and 303m in transitional countries.
- Globally, 39% of people live in free countries (as defined by Freedom House), 24% in partially free and 37% in countries that are not free. Since a peak of freedoms in 2006, by 2017 113 countries declined in political rights and civil liberties and only 62 improved.
- USA, where some perceive gun-possession as a freedom, permits 20,000 small arms *per day* to be exported by an industry six times larger than is needed for home consumption.
- In 1900 there were 3.5 Europeans per African. In 2050 there will be 4 Africans per European.

In some respects, political power is the most backward area covered in this report, the subject most in need of upgrade and change, in *all* countries and political systems. Life goes on however much politicians, apparatchiks, dictators and monarchs try to control it and, in another sense, people at the political centre are crucial to the world's future.

This concerns people and power. During the 2011 Arab revolutions it was said that *democracy isn't only about elections*, and another key notion concerned *losing our fear*. This pinpointed a big question: how to balance effective governance with popular participation. Every kind of system needs to embrace everyone unless we want a world where some thrive and others suffer: the world is crowded, interdependent and networked, everything is affected by everything else and we live in a time of amplifying consequences.

This is an age of throngs. Occasionally people mass in the streets or online, swaying unpredictably between the wisdom of the majority and the madness of crowds. A kind of democratisation and dispersal of power is re-shaping political process, causing authoritarian regimes to become more responsive to their publics and democracies to become more confused by them. This unplanned devolution bypasses conventional party, class, local and sectoral loyalties, articulating emergent public instincts, hopes, issues or grievances more than coherent ideologies.

Distrust of authority and institutions has been growing for decades. Power is easier to acquire, harder to wield and faster to lose. But public clamours can risk hijack by populists, or being tainted by bad information, grumbling prejudice or resurgent historic antipathies, yet they also have an element of what Mahatma Gandhi called *satyagraha*, truth-force. For example, while anti-immigrant sentiments reflect legitimate migrant assimilation issues, they also express people's sense of loss of control of their lives and nations while the problem arises arguably from other causes, such as the surreptitious capture of government by business interests.

Power once reserved for governments has been accrued by corporations, NGOs and billionaires. With privatisation of public services, data control and even war, boundaries between government and business are blurred, making systems change a very tangled process. Power is eroded by hackers, protesters, leaks, 'the court of public opinion', systemic glitches, and leaders' own errors, dishonesties and hidden agendas. Such disarray is problematic inasmuch as social solidarity, shared social goals and good governance are much needed today.

Flaws in all kinds of political systems have accumulated over many years. To gain power, leaders have to be hardened and sociopathic to withstand the trials of getting there. Even so, electoral democracy, 'the worst form of government except for all those other forms that have been tried'

(Churchill), does answer three key needs: for the public to express an opinion when it has one, for it to lend or withdraw support for leaders and for it to replace them when necessary. Yet many democracies are tainted – trust in politicians and parties has declined, particularly in the oldest, original democracies. Governments are easily arm-twisted by shadowy powers-that-be with a capacity to influence the agenda, especially in foreign, military and economic policy.

Nowadays we can distinguish five main kinds of political system: *electoral democracies* (the largest is India); *managed democracies* (such as Turkey, Singapore and Russia) with a semblance of democracy, a token opposition, strong media control and some influence from public opinion; *oligarchic democracies*, with oligarchic dominance and a semblance of democracy (such as Kenya, Brazil, Bangladesh or Venezuela); *dictatorship*, with one ruling party possessing absolute power (as in North Korea, Belarus or Saudi Arabia) or with authoritarian power, attentive to public opinion and with one-party democracy at local level (as in China or Cuba); and *transitional systems*, moving from one state to another (such as Liberia, Nigeria, Hungary or Thailand).

Democracy has substantial problems: the gulf between governments and people's real lives has widened; public debate is as much poisoned and manipulated as it is informed by the media and the internet (and their moguls' agendas); lobbyists are too close to government; influence can subtly be bought or inveigled; and constitutional quirks can lead to skewed outcomes – a range of issues have eroded democratic legitimacy. The public is also under-informed, irrational, narrow, tribal, reactive and short-termist, which doesn't help. Democracy thrives on disagreement, failing to establish inclusive, pluralistic consensus. It is also not good at dealing with issues that are not here yet.

Dictators and authoritarians have their value during times of uncertainty when democracies are hamstrung by deadlock. But their success depends on getting things right – if they don't, or if they outstay their relevance, or they favour their supporters to the detriment of the majority, or they treat people cruelly, they cannot easily be removed. When despots lose the plot, grow old or die, there are serious succession problems. The boundary between democracy and authoritarianism has become blurred, with illiberal regimes rising to power democratically, stacking the constitution in their favour and then extending terms of office to institute deceptive forms of dictatorship.

This whole question concerns *legitimacy*, difficult to define since it involves subjective, fluctuating public perceptions. Dictatorships gain legitimacy if they deliver effective governance while democratic governments lose it when they are 'in office but not in power'. Critical public attention often focuses on people at the top, yet poor leadership ultimately arises from deficient vigilance and pressure from the public. Projection on leaders, whatever their faults, erodes public assumption of its own power and responsibility.

Illegitimate rulers can gain ground when the public looks the other way, deludes itself, closes its eyes or is confused – and thus, by omission, leaders gain undue power to pursue their own agendas. While there is truth in the saying that people get the leaders they deserve, it is also true that tyrants often exceed what people deserve as a political learning experience. Nevertheless, tyrants exist because deficient public process provides gaps for them to walk into. Political power concerns the interaction between society and leaderships.

No system is perfect, and much depends on the motivation and integrity of politicians. Georges Pompidou, a French prime minister, said back in 1973 (in old sexist language), *"A statesman is a politician who places himself at the service of the nation. A politician is a statesman who places the nation at his service"*. Unfortunately, no system has foolproof integrity filters. Political systems depend for their health on the intelligence, judgement and clear-headedness of ordinary people, and this is a critical issue in times to come. Inducements such as jobs, growth and consumerism wear thinner as affluence grows, and public demands become less material, more sophisticated. Such 'self-expression values' prioritise environmental issues, stranger tolerance, pluralism, gender equality and democratic participation, in distinction to 'survival values' emphasising antipathy toward perceived threats, ethnocentrism, stranger danger and distrust.

Political change is needed, not so much in the type of system as in the way it operates. When in the 1980s Mikhail Gorbachev advocated *perestroika*, restructuring, and *glasnost*, transparency, perhaps prophetically he announced it for the whole world, not just for the USSR. There are no neat recipes to achieve such reform, especially since recent technological advances have created immense potential for social control and regime perpetuation, provoking a perennial question: *does the system serve the people or do the people serve the system?*

This will hit a crunch point over the introduction of artificial general intelligence (AGI), involving a ceding of power from people to machine intelligence – a kind of *coup d'état* without human agency. It could mean the *de facto* end of democracy since AGI will theoretically make better choices than humans, or it will persuade us to believe this is the case. How will AGI be programmed, and according to whose priorities and values? How much will the rights and needs of ordinary people be subordinated to the priorities of billionaires, corporations or the deep state? The time-window for these questions lies between now and 2050. We are crucially unready to face them.

Oligarchies

Oligarchies hold a key influence within nations but they have a vital weakness: they extract wealth and power from society, focusing power at the top through capital accumulation, laws, media, restrictions and penalties. But a time-stamp applies: siphoning off wealth and power weakens the productive sectors of society, draining resources and systemic health, and society gets weaker, structurally, socially and psychologically. Deterioration, degeneration and restiveness set in until a tipping point comes where oligarchs themselves start to lose out.

But they are trapped. The system is rigged in their favour, so anything more than an appearance of reform undermines their position. Society slides into a downward spiral. New leaders might challenge the oligarchy, some of them honest, some radical and some exploitative, but outcomes depend on the wisdom of the people who, by this time, might themselves be damaged, transfixed by populists, subject to rash decisions, getting confused or turning violent. In some cases people do achieve political clarity, as in some of the recent 'colour' and Arab revolutions, though they might lack mechanisms to translate their ideas and preferences into forming a new system.

Meanwhile, democratised, free societies forget why they implemented the reforms that made them democratic, taking liberties for granted. New generations can lack the experience of hardship or repression, failing to appreciate the vigilance needed to maintain freedom. This has happened by slow accretion in mature democracies, where subtle oligarchic power has grown pervasive and, after 2008, a popular reaction started growing.

The majority of people, decent as they might be, tend nonetheless to subscribe to constructs that permit oligarchies to do things against majority interests. They wish to believe that the system they live in, whatever its faults, is good, right and inevitable, that everything is normal and people at the top are trustworthy. Oligarchies stay in power through a matrix of incentives and sanctions keeping everyone in line. They might not have outright malintent, yet they act with a self-interest that ultimately is destructive. Ordinary people turn a blind eye to seeing their own role in maintaining this tango of power. Regrettable things develop from there. The 18th Century thinker Edmund Burke once said, *"For the triumph of evil it is necessary only that good people do nothing"*.

A substantial political correction is needed. This will be painful since it needs to uncover the motivations of both leaderships and people. Avoidance will lead to eventual crisis. Oligarchy, with its control of media, government, law and the economy, and playing a key role in maintaining the conditions leading us toward global crisis, needs transformation through mass unsubscription from its key tenets – revolution is less necessary than simple withdrawal of support.

The public needs to connect the dots, shifting attention from single issues and grievances to an all-round, ethically-driven, courageous change of perspective and priority – *losing our fear*. A thriving system needs social mobility, public service, divested interest, philanthropy, justice and equity, care

for the vulnerable and a full, longterm approach to optimising civilisation and conserving the world's resources. The landscape is shifting to one where the resilience of the whole system is at stake, and it is in everyone's interest to look at our socio-economic systems in the round.

Pulling strings

If you want to influence things, do it through money. The biggest players have a critical influence in the way the economy works. According to Oxfam, 82% of added wealth generated in 2017 went to the richest 1% of the world's population. The same year saw the largest ever increase in dollar billionaires, rising to over 2,000 in number – their wealth grew by $762bn that year (that's one-third of UK's total annual GDP).

But corporations hold most of the world's wealth. They are controlled by small numbers of people, many of whom serve in strings of companies. Researchers in Zürich identified a network of 1,318 global firms, each connected to at least twenty others, together generating 20% of all corporate revenues in 2007. They control a further 60% through indirect shareholdings. Tracking back through their shareholdings, these 1,318 companies were found to be controlled by just 147 firms, many of them financial institutions (Barclays Bank, JP Morgan Chase, Goldman Sachs, etc). Key people in these companies amount to one thousand or less people, in total, globally.

The world economy is thus controlled by a small number of companies, themselves controlled by a small caucus of interlinked people. This isn't exactly a conspiracy to control the world, but it does look and operate like it – it is more an ecosystem of big players with shared interests, and it is certainly not a free, meritocratic playing field. It is a loose, concealed cartel with a variety of subgroups within it, tugging in different directions though sharing key aims: to maximise profits and influence and to maintain that position. This includes manipulating markets and governments and even engaging contractors to fight wars. Some are dynasties and others rise and fall over time but their interests are congruent and they can coordinate and collaborate easily and quickly. A few phone calls and meetings can fix things.

Indeed there are conspiracies and organisations pursuing certain goals, and sometimes they take hold of events to yank things this way or that, but they usually have specific aims, such as to promote American interests, influence governments or key nodes in the system, or promote offshore, intel, oil or military interests. They can jog things with varying degrees of success, but this constitutes influencing, not controlling, the world, and it is neither infallible nor all-knowing. It is an interactive ecosystem, and the rich and powerful sit in different schools of thought. Some are American, some Chinese, some Arabic, some transnational. Some are old money and some are upstart billionaires. Some are shady, some upstanding. They have a variety of beliefs and attitudes. Sometimes there are rivalries and frictions, even standoffs or wars. But as a group they behave largely in concert, avoiding rocking the boat, whether or not they discuss matters.

This is, to an extent, human life. But it is a very powerful grouping. Their capacity to capture wealth and resources, pull strings and promote ideas is significant. Their capacity to stay out of the limelight is extensive, especially since they control most of the media. Working through the offshore sector they can influence nations, use private military and intelligence contractors and engage hosts of agencies, companies and trusts to work for them, run by squadrons of people who don't think about who and what they're working for – they just do their job and collect payoffs.

The significance of this is that the core of the world system is unaccountable and opaque, and this is not necessarily the best for humanity. They have built a system that is taking the world to a crisis point. They can block change and, equally, bring about change, yet their influence is not as total, effective, advanced or all-encompassing as many conspiracy theorists might believe. They make mistakes and miscalculations. Sometimes events, or the public, or mavericks, catch them by surprise. Their systems can be clunky and their disagreements harmful. Sometimes they don't get their way, or their kids or wives don't play the game or, like the rest of us, they get ill or die. But

without them, the Syria war would have been shorter, the arms and oil industries smaller, the financialised, offshore economy would not exist, the neoliberal agenda would not have prevailed and we would live in quite different times. Many things would have happened differently.

Three key issues stand out for the future. First, the technology and AI rush implies social control potentials that humanity badly needs to understand. Second, economic transformation to build sustainability into our societies cannot happen unless the high-growth, high-profit, corporate system changes or is somehow levelled downwards. Third, this powerful hierarchy has moulded world society around the economic system it dominates while the priority for the future is to mould the economic system around society and the environment. And a key question is: *who decides?*

Gender politics

An historic gender rebalancing is taking place. Longterm, it has big implications for social power, values and standards. Starting in the West around 1900 and escalating in the 1960s-70s (Feminism 1.0), it has been spreading, partly by diffusion and partly because women worldwide independently form conclusions of their own. The second wave, Feminism 2.0, emerging in the developing world, concerns family and community change, socially-inclusive, justice-oriented values and, not least, the basics of human life such as poverty, access to healthcare, education or women's right to act autonomously. Feminism 2.0 has repercussions for peace in the Middle East, development in Asia and Africa, social change in India, social healing in Latin America and, globally, for religion, ecosystems, community care, conflict and the way society works.

This shift is occurring not solely amongst women. As generations change, men cleave roughly two ways, between progressives whose values are changing and resisters who seek to reinforce gender stereotypes and fear loss of status. Men, oppressed too, have not seen their dominance succeed as it was supposed to – the evidence is visible in pollution, resource exhaustion, military destruction, social insensitivity, labour exploitation and other problematic discontents. This transitional cleavage between men is likely to resolve itself as older generations die off – after all, boys are the sons of mothers and, to be loved and respected by partners and daughters, or to be happier in themselves, male change is inevitable.

This cultural shift goes deeper. It concerns a questioning of gender concepts. A new trend toward gender flexibility is embodied in the LGBTQ movement. This is not simply psychological gender-role loosening: advances in plastic surgery permit gender-reassignment operations, happening not just in the West but also in countries such as Iran, Thailand, India, Colombia and Brazil. New LGBTQ gender roles are emerging worldwide. Anathema to traditionalists, notably in the Arab, African and Indian worlds, and even looked on as evil and punishable, one counterbalancing factor is that, on average, gay and lesbian people tend to have higher behavioural integrity standards than average heterosexuals, practicing less crime, violence and corruption – and this cannot be ignored.

There is yet far to go. In 2014 in Nigeria, laws were passed making same-sex marriage, public displays of same-sex affection, clothing deemed to be for the other sex and support for LGBTQ organisations illegal, and gender-flexibility is seen by many there as 'un-African' and a threat to families and society – so things are going backwards in some countries. Yet gender equalisation is incrementally changing societies in an historic, trans-generational manner. This will continue, though globally the balance has not yet tipped: it has advanced most in developed countries, in cosmopolitan cities and amongst progressives. It involves change at all levels – social roles and relationships, traditions, psycho-emotional issues, economics, power, families, violence and in the nature of human cultures.

Meanwhile, historic male dynamics of violence, exploitation and insensitivity periodically lash back through terrorism, sexual abuse, domestic and intercommunal violence. But a new maleness is emerging that is far more consensual, empathic, sensitive and human-centred. A competitive, patriarchal system prevails, yet the global trend moves toward greater gender equality. This fast-

but-slow change goes along with other issues such as justice, inequality, economic and ecological change, penetrating all departments of life, and it cannot be separated from them.

Gender role transformation involves more than pay equality, glass ceilings, female executives, domestic and childcare duties, LGBTQ rights or social behaviours. It involves the very nature of civilisation, the way it uses resources, augments natural capital, balances individualism with community, designs architecture and cities, farms the land and integrates with nature and human nature. It concerns inclusion, care, nurturing, empathy, support and those qualities our faceless, exploitative, conflicted world system lacks – where politicians are supposed to be tough and executives must extract the maximum from the market. Deep cultural, social and psychological issues, conscious and unconscious, exist for women and men, and it will take time. But the tide is turning, and male violence, women's rights, family life, cramping gender-role traditions, female power, equal recognition and pay, are all stepping stones in this historic shift.

While at birth 50.4% of the population are males, by age 30 the balance tips and, of centenarians, around 75% are female. Thus the maturing of the world's population brings with it an incremental gain in feminine influence. Historic-scale gender rebalancing is a values, not just a numbers game, and while it isn't easy and it brings up deep historic pain, something unprecedented is going on. By the late 21st Century gender balances will be very different. Beneath the complex psychosocial megatrends of today there are signs of a nascent social reintegration, connected with the rebirth of feminine influence and the reconstitution of families and tribes. At core lies one key issue: *social empathy*. Humanity needs to become more human, familial and friendly.

Technological change

Robotics and artificial intelligence could provoke a variety of social responses, some of them serious. *"It is possible for a majority to be left behind"* (Erik Brynjolfsson of MIT) – it is *that* serious. We could see two worlds bifurcating, separating the small number who benefit from and the large number at the receiving end of technological change. In the developing world there is need for gainful employment, not wholesale automation, but automation will probably mean low wages in order to under-price automated systems – this profoundly affects women and people in poor countries. In richer countries a crisis looms as jobs are lost at *all* employment levels and the real economy declines in relation to the automated and financialised economies. Automation benefits investors and wealthier consumers, not those earning a living through wages and those at the bottom of the world's social pile.

Even if universal allowances and new social possibilities develop to compensate for automation, implementation will take time, provoking potential social resistance to change and proving trickier to carry out than today's upbeat billionaire tycoons want. It will require enormous financial transfers from automated sectors and regions to recipient social sectors and regions – a tax on automation. Business will still need consumers and stability, and people will still need decent living conditions and a feeling of progress. Without these, trouble is likely: disaffection and restiveness, growing mental health issues, loss of social cohesion and exaggeration of wealth and power imbalances, bringing danger to the winners as much as to the losers.

Universal allowances pose a problem. Governments or companies will, in effect, hold monopoly control of millions of people's incomes. Today, we can (theoretically) find another job, but with universal allowances everyone will have one income source. The adequacy and fairness of these allowances and the terms, conditions and control issues attached to them matter a lot. If a person refuses an implant, protests or fails to conform to requirements, allowances could be reduced or withdrawn as a penalty. The social control risks are thus enormous. Would allowances operate with respect for freedom and sociodiversity, or would they be used to control people?

Automation of dangerous, drudgerous and dirty jobs is largely welcome. But if robotics mean replacement of most people's work, consigning them to a life of hardship or rejection, forced leisure

or virtual reality gaming, it could accrue enormous unintended consequences. People will need new kinds of work involving lifelong learning, creativity, social contribution and activities that business does not cover. This could bring substantial benefits if done well and applied at an acceptable pace, with a whole-systems approach. It could also be a disaster. The wider implications of automation are enormous, potentially pitting the system against humanity. Without getting this right, instability, unrest or social deterioration could occur. Automation and AI development might be slowed as a result, simply because of the immense social complications involved.

Would super-intelligent robotics be imposed or inveigled upon society, with or without informed public support and consent? Automation has to be beneficial to society as a whole, not just to special interests. Without majority consent, social cohesion and disquiet could go critical. Will the net direction of travel lead toward a disintegration or a reconstitution of society? If it moves toward reintegration, will the impetus arise from the bottom up or cascade down from above, through micromanaged systems using data-driven social engineering? The character of society is at stake, and, again, *who decides?* This might not be answered by 2050, but it will be fermenting vigorously. At stake is a redefinition of the balance between social control and freedom.

On the edge

The world is on the threshold of enormous political changes, and where this will go is at present unknowable. Many stored-up, overdue issues are pending, and we're reluctant to open them up for fear of being overwhelmed – but this delaying makes potential overwhelm more likely. The danger is that multiple issues could erupt simultaneously, with too much happening at once.

Elsewhere in this report the inadequacy of nations was raised: many of them fail to reflect emergent social, political, economic and ecological needs. As societies modernise, their societies and politics change while institutions tend to remain stationary. Legitimacy, governance, service delivery, social justice and sustainability become key issues. We are entering a period of overdue sociopolitical fermentation which will not be easy to stave off, pressed by encroaching pressures such as climate change, mass migration, gender politics, ecological and population crises. Even oligarchs and the deep state are in disagreement over what to do – some seek new ways to maintain control and others seek new ways to progress things, with both fearing coming under the spotlight.

An acute area of risk lies around AI and the way it is implemented, its reliability, its capacity to subvert human agency, and even the threat it brings to power structures and oligarchies. A further area of concern is the public and its difficulty in encompassing the scale of what is going on.

Another area of concern lies in the vision and integrity of political leaders and representatives. The media have held a key role in promoting an adversarial, agenda-driven, sensationalising pressure on politicians that skews public dialogue, putting politicians on the defensive. This fails to fulfil the media's role in objectively scrutinising politics, also concealing the hidden agendas of media owners. Pressure on politicians distances them from ordinary people and ground-level reality, isolating them and dissuading people with integrity, sensitivity and a sense of public service from standing for office or from succeeding if they gain office.

We could be heading toward turbulent times when ordinary people lose their fear, attempting to gain more influence over events, not least out of frustration over lack of political traction. The success or failure of this emergent popular feeling will depend greatly on the maturity of crowds, their capacity to think beyond themselves, to act together, form clear judgements and apply effective ways of bringing about reform. Alternatively we could head toward dystopian times where humanity cedes its sovereignty to artificial intelligence and those that control it. But even then, one open question is whether those who control it are unleashing a monster too big even for them.

Interesting links

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Ecosystems

Things that may interest you

- The biggest programme of conservation, reforestation, cleanup and environmental repair is in China, spending $1 trillion over the current national five-year plan, more than USA and EU combined – though it is faced with enormous and urgent environmental challenges.
- Unless things change, by 2050 overall human consumption – the global ecological footprint – will be twice the carrying capacity of the Earth. Currently it is 1.5, already in overshoot.
- The economic value of ecosystem services is estimated as twice that of global GDP.
- At current rates, by 2050 there will be the same weight of plastics in the seas as fish.
- Many infectious diseases arise from damming, irrigation, deforestation, hunting, urbanisation and habitat fragmentation. Use of antibiotics in agriculture and dispersal of agrichemicals into the environment also cause many human, animal and plant diseases.
- Biodiversity-rich mature forests are projected to decline by 13% and land-based biodiversity by 10% by 2050. Ten billion trees are being felled every year. Global tree-cover loss in 2001 was 13.8m hectares and in 2017 it was 29.4m ha, up by 113%.
- In coming decades, loss of biodiversity and ecosystem service benefits will cost $2-5 trillion per year, affecting economic growth and particularly the poorest people and areas.

In the 21st Century we must redefine what 'wild' means, making the best of whatever we land up with. Even remote parts of the world are affected by pervasive human influence – these pools of natural, untamed wilderness are dwindling. However, around 10-15% of the Earth's surface is currently under protection (though underfunded and unsafe). Now in the so-called *Anthropocene* era, humanity has impacted so much on the planet that it shows up in permanent, irreversible, ecological and geological ways.

We are also in the midst of a great man-made species extinction – 12% of bird species are likely to go extinct in coming decades, thanks to agriculture, logging, habitat and food source loss, invasive species, hunting, climate change, urban growth, fires, pollution, disturbance and overfishing. At current rates, 30% of amphibians and invertebrates, 20% of fish species, mammals and reptiles, 50% of primate species and 70% of plant species risk extinction this century.

The core problem is that *the ecosphere and the human economy mutually contradict and undermine each other*. This started around 1820 in the early industrial revolution, going critical and global around 1970. Growth economics has been a priority for two centuries, leveraged by coal, oil and resource, animal and human exploitation, but precedence must by necessity tip toward the ecosphere in coming decades – and humanity's cooperation to save the day will matter greatly.

Our economic system functions by evading the full, longterm ecological costs of its extractive and exploitative mode of operation: it depletes resources, ecosystem services and the planet's natural capital, leaving a big problem for future generations to sort out. Those future generations are now here, and this is the time, and we are the people getting the consequences. It's all about bulldozers and dynamite: when nature and humans come up against each other, nature has to move over. We're in a long, drawn-out collision of economic and environmental systems, with dangerous consequences for both.

One radical proposal is to turn half of the Earth into protected areas, with an emphasis on placing environmental care responsibilities in the hands of indigenous and local people by reorienting their local economies and supporting new kinds of eco-friendly development. A major international convention is proposed, to replace the current 1992 Convention on Biological Diversity signed by

every nation except USA, which ends in 2020. Many of its goals have not been attained or fully funded. The 2010 Aichi Biodiversity Targets, also to be met by 2020, have failed – these were intended to halve habitat loss and deforestation, manage fisheries sustainably, prevent the extinction of threatened species and minimise the impact of climate change and human agency on coral reefs. To prevent the above-mentioned collision, radical steps are needed, not just to preserve the world's 846 ecoregions but to transform economies to provide the necessary $100bn per year to fund environmental protection (currently standing at $4-10bn per year) and also systemically to change many of the economic causes of collision.

Though this plan is ambitious and costly, the price of not doing so is higher, impacting increasingly on the profit margins of corporations and the health of economies, and kicking in further as the decades progress. By 2017 it was found that 10% of the 846 ecoregions were 50% protected, though many of these are the easiest to protect and some of them nevertheless risk encroachment.

How this plays out by 2050 is an issue of historically decisive proportions. International agreements made and *fully implemented* now will make a big difference. A substantial portion of today's problem arises from underfunding and incomplete implementation of existing plans and agreements. Nature is weakened and damaged, a return to pristine former times is not viable and sympathetic human environmental intervention and management are now essential. Ecological issues are becoming economic issues.

Ecosystem services and the human footprint

Ecosystem services are resources and facilities that nature renders to us, without which we will not survive. They include *support* (habitats, natural processes, air, water, land); *provisioning* (food, fresh water, fuel, medicines, materials, air); *regulation* (of climate, weather, flood, drought and disease, plus air and water purification); and *culture* (psychosocial, ambient, recreational and spiritual benefits). Since the 1970s ecosystem services have been under strain, increasingly drained of their capacity to replenish themselves. Nature is much more than just a resource yet it is treated so, and its fate will be sealed by people in urban offices who make their living imploring us to consume its products. One of the many paradoxes of capitalism is that the rarer a species or resource, the higher its value and the more profitable it becomes to exhaust it.

Access to ecosystem services such as water, timber and fertile land is becoming a critical issue for economic growth and sustainability. In terms of natural capital, some countries, particularly richer ones, are in deficit, dependent on importing the products of ecosystem services from elsewhere – but those regions in surplus are insufficiently so to counterbalance the deficits. Energy and resource issues, climate change, food insecurity, biodiversity loss, depleted soils and fisheries, pollution, soil erosion, water stress and weather events are creating supply-and-demand tensions in the economy.

Humanity's ecological footprint or impact is in overshoot, at 1.6 Earths. The world economy is exhausting many natural resource stocks, reducing bioproductive land area, polluting air and water and creating waste sinks at an accelerating rate. This overshoot will impact more and more on human life as natural limits are crossed. We do not know where those limits truly lie because we have never conducted such a global depletion experiment before, but simple commonsense suggests avoiding even approaching those limits because the outcome can be irreversible.

These impacts affect poorer people and countries more than affluent ones since they have fewer fallbacks, economic resources, technologies and spare capacity to absorb shocks. However, affluent countries are not at all exempt from risk or repercussions, indirect or direct. The greatest tragedy is that we have lacked the will to apply any more than modest remedial measures during a time when we have had the wealth to do it. This remedial window of opportunity is gradually closing.

A 2005 UN-sponsored Millennium Ecosystem Assessment identified four key 'emergent' findings:

1. out of twenty-four ecosystem services examined, 60% were degraded or overexploited, including fresh water sources, fisheries, air and water purification, and natural regional mechanisms regulating climate, natural hazards and pests;

2. the risk of sudden, critical ecosystem changes is increasing, particularly with disease emergence, deteriorating water quality, coastal dead zones, fishery collapse and regional climate change;

3. fragile dry-land ecosystems where biological productivity is low and population growth and poverty are often high are seeing an increase in poverty and inequality, which then acts as a cause of downturn, emigration, conflict and further ecological degradation;

4. together with climate change and habitat loss, nutrient loading is a major driver of ecological change – chemicals, sewage, pharmaceuticals and fertilisers dumped in the soil, rivers and sea.

Work to reverse problems with land degradation, pollution and biodiversity loss in the developed world has been measuredly effective, with admirable achievements and many lessons learned, yet it has been insufficient in scale and scope to outweigh the ecological and resource damage taking place, and the fundamentals creating such destruction, while having been tweaked, remain in place. The developed world has also shifted some of its problems to the developing world (such as toxic industries, refuse disposal, electronic waste and recycling), meaning that the net global gain from these improvements is less than it appears. The key issue is that it is insufficient simply to make corrective tweaks to human systems and behaviours: to adjust our civilisation to nature and reduce the friction between them, fundamental systemic changes are needed.

Positive eco-supporting interventions need to be prioritised, including widespread investment, policy changes and financial instruments to support environment-friendly practices, elimination of perverse subsidies encouraging energy and food over-consumption and undue exploitation of nature, and regulation of harmful technological, waste disposal, farming and land-use practices. Global fossil fuel subsidies amount to around $460bn per year: if this were invested in ecological support and remediation, much would change in the environment and with human impacts on it.

Such interventions need to involve root-and-branch behavioural and technical changes to reduce consumption, waste, toxicity and pollution; comprehensive adaptation of economic, industrial, transport and urban systems; and investment in public services such as education and health to help change public behaviour. In addition we need to reduce socio-economic inequalities and poverty to help ordinary people, small farmers and communities develop ecologically sound methods, manage local ecosystems and increase their and the world's overall resilience to environmental and climatic change. Above all we need to deal with environmental stresses *before* they become urgent. If the world fails to get serious about such issues, then it's heading for a train-crash. This possibility has been visible for some decades – these questions needed tackling earlier.

There are barriers to favourable change. Governments, institutions, financial markets, banks, investors, media, lobbyists, marketers and vested interests all variously obstruct change or they 'greenwash' the issues while carrying on with symbolic and cosmetic changes. Corruption, weak regulation, perverse taxes, lack of transparency, subsidies and tax evasion all undermine the application of environmental policies. The people most affected by environmental issues – the poor, small farmers, rural dwellers, women, minorities and indigenous groups – lack political and economic influence. Overall, a culture of avoidance, denial, unawareness and suppression continues to prevail in the public domain. So large-scale environmental damage continues.

Partial and profitable environmental solutions such as electric cars, 'clean' nuclear power stations and eco-tourism tend to be prioritised over whole-systems and alternative solutions. There is also wilful ignorance over the effects of electromagnetic and pharmaceutical pollution, pervasive ambient toxins, habitant destruction and fragmentation, and also inadvertent geoengineering – environmental damage with fundamental global-scale effects. At ground level and amongst academics, politicians and business leaders there is insufficient knowledge about ecosystem services and their importance.

Mitigation and adaptation

On average, 75% of world GDP is spent on consumption and 25% goes on investment. In coming decades remedial investment will need to rise to 30-35% of global GDP to fund many remedial and adaptation projects. However, part of this investment can be funded by investment switching. These projects include: substitutes for fossil fuels and agricultural phosphates; cutting emissions; regeneration of ecosystem services; cleanup of nuclear stations, toxic and sewage treatment sites and waste sinks; restoration of habitats, species and natural capital; infrastructural adaptations to buildings, roads, rivers and coastlines; disaster-related expenses; and facilities to protect resources and deal with displaced people, migrants, emergencies and contingencies.

Some investment will yield small or slow direct returns but, if such investments are *not* made, the future socio-economic and environmental costs will be considerably higher. The true returns are bigger, wider and longer term than customary short-timescale financial planning encompasses – and this too needs to change. At a time when global economic growth is likely to slow, investment needs to rise, and low direct returns will probably further slow the world economy. Such investment needed to start fifty years ago, and some did, but it was stopped in the 1980s deregulation frenzy.

Environmental problems most impact ordinary people and the poor. They drive small farmers and the bottom billion downwards economically as a result of floods, droughts, failed harvests and resource and habitat loss. To feed everyone, the UN estimates that by 2050 a 70% rise in food production is needed (though this is questionable) just at a time when crop yields are declining and environmental conditions are deteriorating. This contradiction implies shortages to come, rising food prices, price spikes and competition for scarce food stocks, in bad years leading to possible famines. These can be mitigated by lifestyle, dietary and consumption changes, elimination of food waste and reduction of meat and dairy intake, but changing society's habits takes time.

As natural capital becomes scarcer than financial capital, the effectiveness of the world economy to deliver decent lives for people will depend on proper ecological and resource accounting and proactive mitigation policies – otherwise social and political stresses are likely. Recent wars in Syria, the Sahel and Yemen, and criminal violence in central America, all had ecological causes, for example. Progress has been made in nature conservation but we have landed up with islands of good news amidst an ocean of bad news, and environmental concerns have customarily been treated as a political side-issue. A fundamental rethink and reorientation is needed, leading toward systemic change to prioritise environmental measures, improve natural capital, defragment habitats, reduce food and resource demand and grapple with the many environmental imperatives before us.

This reorientation might work better in authoritarian-ruled countries than in democracies, since centralised power generally thinks longer term, with a greater capacity to implement measures that, if truth be known, need to be draconian. Democracies need to be more resolute, thinking longer-term, if ecological problems are to be properly addressed – that's politically difficult. Systems change needs to move toward a circular, recycling, sharing economy, as mentioned in this report's economics chapter. The footprints of affluent people and countries need to diminish by at least 50% – this might sound extreme, even punitive, but the price of omitting to do so could be higher and better-off people would, in effect, be committing murder by default.

Most environmental remedies will be implemented in the world's fields, rivers, forests and villages, but the offices of power are where a critical difference will be made. Individuals, civil society, NGOs and scientists have pushed the environmental agenda forward, and consumer and public pressure do work, but the powers-that-be in governments, banks and corporations constitute both the biggest blockage to and also the biggest potential source of global-scale breakthrough.

Recent experience in disaster relief shows that the possibilities for spontaneous, improvised local initiative and action are high – first responders are usually individuals, volunteers and local bodies – and the same might apply in future environmental crises. Currently the prospects for ground-level,

eco-friendly social change and remedial action are quite promising. Bottom-up community initiatives have a future, even if top-down measures fail to achieve sufficient results.

If the world makes large-scale changes of policy and practice, implementation will take *decades*: growing a biodiversity-rich forest, cleaning up toxic waste and pollution, reconstructing and adapting infrastructure and cities, changing public habits and developing innovations all take time. The world will go through decades of uncertainty, at times anxiety, and this could exacerbate public insecurity and political instability. Competing ecological and anthropocentric priorities could be a cause of political polarisation, within and between states.

The environmental age

The environmental age began around 1962 with Rachel Carson's seminal book *Silent Spring*, about pesticide and chemical pollution in modern farming. Building up impetus in environmental work has taken a long time and this tardiness charges its price. Sustainability is not only a matter for governments and corporations: it engages all of society and, while reducing consumption habits is a major step, much more than this is needed, including social engagement and mass mobilisation.

A time when environmental and economic priorities begin to converge is coming into view. It will arrive when it is perceived to be more profitable to put environmental priorities first. The benefits to the economy, during a time of transition to a circular economy, will eventually be significant due to improved efficiency and reduced waste and excess. Transition could be difficult economically but the payoffs will be enormous in terms of creating systemic and social efficiencies.

Today we burn up so much time and energy running hard to produce, consume and pay for things we don't actually need, or which could be enjoyed more efficiently and economically. Much economic activity is burned up servicing debt, which itself fuels overconsumption and feeds inequality. Our individualised lives are fundamentally inefficient – cars, for example, are unused for 90% of the time. Savings will be immense and life will in some respects become easier. The way we utilise resources and ecosystem services, generate energy, feed the population and sustain ourselves can improve longterm, and this will have significant payoffs. But the next 30-50 years are critical and hazardous. Everything that is unsustainable must go.

We are peppered with news of the latest environmental issue or disaster and the media perpetuate the problem by reporting a steady barrage of daunting single-issue environmental news, with the effect of disempowering the public, giving the impression that the problem is too vast to address. So people shrug shoulders, worry and get on with their busy lives. Treated as single issues without connecting up the dots makes remedial work – such as the establishment of protected marine conservation areas to help propagate endangered ocean species – more difficult. Remediation is only partially successful if the normalised practice of over-exploitation continues. The problem needs to be addressed totally, at all levels, and the consumptive and polluting causes of most environmental problems need tackling comprehensively.

The solution to swarms of pests or fungal outbreaks in food crops is not to spray affected areas but to rebuild ecosystems and farming methods such that natural balances are improved. Monoculture in industrial farming might give high yields and low food prices in the short term but, longterm, it adds costs and complexities as consequent problems arise from monoculture. The solution lies in scaling down agriculture to create a more biodiverse system run by smaller farmers, with education, rural support, renewed market systems, fair trade and social development schemes attached. Narrow accounting does not show the benefits of an all-round approach, but wider, whole-systems cost-benefit accounting does. This is an example of eco-favourable systemic change. It needs applying at both the production and the consumption ends, and not just materially but also with love.

Something big needs to shift in the way of attitudes, priorities and perceptions, for this to happen. In terms of worldview, we need to recognise Earth as a *being*, with needs, operating rules, priorities, rights, sensitivities and even a heart and consciousness. It is bigger than we, it gives us life and we

are dependent on it. When and how we achieve lift-off with the global environmental project is the biggest question of all. Yet *necessity is the mother of invention* and, by the end of the 21st Century, if we have failed to make the necessary systemic changes, humanity's chances of a decent future life are likely to be pretty slim. It all rests on what we do, or omit to do, in the years up to 2050.

Interesting Links

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Species Extinction – the facts, IUCN, 2007. https://cmsdata.iucn.org/downloads/species_extinction_05_2007.pdf

An Ecoregion Approach to Protecting Half of the Terrestrial Realm, Dinerstein *et al*, 2017.
https://academic.oup.com/bioscience/article/67/6/534/3102935

Ecological Civilisation – articles by David Korten. http://davidkorten.org/library/articles-reports-papers/

The European Environment, Synthesis, EEA, 2010. https://www.eea.europa.eu/soer/synthesis/synthesis

Environmental Issues (good links), Global Issues website. http://www.globalissues.org/issue/168/environmental-issues

Climate Change

Things that may interest you

- The main greenhouse gas is water vapour. It increases with temperature and warms the climate, but cloud formation reflects heat back into space, so its effect is mixed.
- Current majority scientific consensus estimates that greenhouse gas emissions could rise by 70% by 2050, leading to more intense weather events, glacier and permafrost melt, flooding, sea-level rise, rainfall, biodiversity and cropland loss, and other environmental pressures.
- Global warming is not a foregone conclusion: there are unknowns and, while the balance of accepted evidence points toward warming, some factors (ocean cycles being one) are insufficiently researched. Forecasting is also always a matter of estimating probabilities.
- Around 21.5m people have been displaced by climate change since 2008 (UNHCR).
- The estimated range of possible global temperature rise by 2100 is 2° to 6°C. Current assessments reckon a 3°C rise is most likely. The richer nations of the global North are responsible for 70% of CO_2 emissions while they bear only 18% of global costs.
- By 2040, one in four children worldwide will be growing up in water-stressed areas.
- Despite the Paris Climate Change Agreement of 2015, a problem for global monitoring is that many nations massage and falsify the figures they submit – so the agreement is in effect undermined and its implementation is endangered.

Climate change – especially the possibility of *runaway* climate change – is one of the big global risks of our time. Whatever climate sceptics might assert, climate change is happening. But questions remain: *what drives it, how strong is each driver, how will it develop* and, particularly, *what should we do about it?* Final answers will be known when future decades actually arrive. Until then we rely on scientific models and forecasts, unfortunately shaded with fear, hope, politics and sectoral interests. The science is not as settled as many assert, but it has advanced nevertheless.

This is not solely a question of global warming – it concerns increasingly extreme climate trends, harsher weather events (storms, floods, droughts), atmospheric turbulence, varying regional impacts and the ecological, social, economic and political consequences that arise from all of these.

Global debate focuses greatly on climate change, while the complete spectrum of global issues and their interdependencies is thus easily obscured and downplayed. Poverty, pollution, population, ecosystem degradation, economics, climate change and everything else are totally connected – for example, the more that there are extremes of poverty, wealth and inequality, the more that there is ecological degradation and climate change.

Within the field of climate change there is a need for much more research, including investigating the comparative heating effect of CO_2 and other greenhouse gases, and a range of complex environmental feedbacks, the influence of clouds, ocean currents, solar cycles or even man-made electromagnetic and nuclear radiation. Some scientists do research them, but they aren't usually invited to dine at the climatological top table and are often inadequately funded.

Then there is the first-nation or shamanistic perspective in which *Gaia* is seen as a living being in possession of intelligence and feeling, grieving and balking at its treatment by humans. The atmosphere, the most fluid and responsive part of our planetary system, responds by becoming critically unstable, imbalanced and turbulent – it gets angry and upset. This perspective does not accord with scientific logic, yet it makes sense nevertheless, and these are changing times in which we need to see things broadly. Perhaps there's a message here.

Anthropogenic global warming (AGW) theory holds that man-made greenhouse gas emissions are leading to observable climate change and warming. The main greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide, ozone, CFCs and HFCs. They originate from industry (17%), power generation (21%), waste disposal (3%), land use changes (10%), buildings (10%), fossil fuel drilling, mining and processing (11%), agriculture (13%) and transport (14%).

Increased greenhouse gas emissions are expected to:

- raise Earth's average temperature – this varies regionally, most close to the poles;
- influence the patterns and amounts of rainfall – floods and droughts, critical in some areas;
- diminish permafrost, ice and snow cover – reducing freshwater supplies and heat reflection;
- raise sea levels – variably, since tidal seawater piles up unevenly in different places;
- increase ocean acidity – harming oceanic life, coral reefs and ocean processes;
- increase the frequency, intensity and duration of extreme weather events;
- affect ecosystem characteristics, such as vegetation, extinctions, topsoils and so on; and
- increase threats to human wellbeing, food supply, water sources, economies and infrastructure.

In AGW theory, the extent of future change depends on how much we reduce CO_2 emissions, and there is a long time-lag between emissions reductions and CO_2 sinking. This said, it is not clear exactly how much CO_2 is actually a driving force in climate change. Emissions, still rising, are understood to lead to increased stress in already stressed areas, affecting water supplies, soils, agriculture, forestry and marginal climates. Richer countries can buy their way out of such problems but they can't do so forever, while poorer nations face climatic changes they cannot easily handle. This affects richer nations' food supplies, inward migration and global stability – especially if it affects pinch points such as the shipping lanes passing between unstable Yemen and Somalia.

The World Bank reports that keeping global temperature rise below 2°C by 2100 will require $3.5tn a year in energy sector investments until 2050 (world GDP in 2017 was $126tn, or 2.7% of GDP). Natural disaster impacts cost $520bn annually, forcing some 26m people into poverty each year. Up to 2030, the world will need to spend $90tn on new infrastructure, mostly in middle-income and developing countries. There are around $19tn in gains from such transitioning, but efforts should not be limited to short-term and gainful activities. The full price is incalculable but the full costs, in terms of raised prices and taxes, shortages, disasters and disruption, will outweigh the benefits.

Uncertainties

There are uncertainties around climate change. IPCC rates its confidence as 'likely' (66%) that 'most' global warming since 1950 has been due to human-caused greenhouse gas emissions. Some scientists argue that computer models have overestimated the role of greenhouse gases, ignoring oceanic effects or a solar magnetism-related warming cycle that peaked around 1980-2005 which may turn cooler around 2020-60, then warm again later in the 21st Century. So there is debate.

A range of proposed factors might affect climate change. These include enhanced carbon capture by plants as greenhouse gases increase (since they and the added warmth encourage plants to grow); growing production of aerosols and biosols (pollution, dust and bio-particles) that reflect and disperse heat and generally increase cloud cover; changing human land-use patterns (particularly stripping the land for city growth, agriculture and deforestation); ocean currents (which could be changing); natural longterm terrestrial and solar variability cycles (generally overlooked); and regional phenomena. All of these can tip the balance either way, some reducing and some increasing warming, with complex and largely unknown effects. A few scientists reckon Earth could actually go into a cooling phase, perhaps even suddenly.

The weight of scientific opinion ranges against these other hypotheses, yet it would be wise to research all options without prejudice and also to define adaptive resilience projects not only in CO_2-related global warming terms but to encompass wider possibilities. This is not a simple binary

question of correct or incorrect theories – it is one of interrelationships and proportions, the number of factors at play and how they affect each other. Media and politicians prefer the formula to be simpler, and some scientists, perhaps to their eventual detriment, try to make it so, but it is not.

We are in uncharted territory. Current theories hold up in the opinion of many and in the context of the data and climate modelling that has thus far been used. But uncertainty suggests it is wise to spread bets and widen strategies. One key issue is the way humans have weakened the global ecosystem, thus reducing the natural moderating, balancing and cleansing effect of ecosystems.

From a resilience and contingency planning viewpoint, two issues are crucial: *weather events* and *climatic extremes*. On the ground, things change and big decisions are made as a result of these, since they impact critically on people and local systems. While it is probable that CO_2 causes and amplifies such events and extremes, CO_2 makes up only about 0.041% of atmospheric constituents, out of a total of 3% of greenhouse gases. If a small constituent has such a big effect, it is also plausible that other small influences have an effect. The main greenhouse gas variable is water vapour and, in the longterm, the quantity of water vapour can be influenced by environmental restoration, reforestation, rewilding and new agricultural and urban planning practices.

Weather events and extremes have a definitive effect on humanity and nature. An area can revive from one disaster if the impetus, the people, the knowhow and the resources are there, but multiple instances such as repeated droughts or storms, or a disaster combined with a conflict or bad politics, can leave permanent and pivotal consequences – emigration, biodiversity loss, land abandonment, local economic downturn and downward spirals of deterioration. So weather events and extremes have ways of drawing lines and making a critical difference.

The depletion and fragmentation of bioregions by human activity reduces their capacity to respond to changing climatic circumstances. This affects nature's resilience and responses to climate change, and it affects humanity too, and its own resilience to change and misfortune. An all-round approach to human resilience is needed, to help societies and economies adjust to *whatever* trends and threats come their way. This is important: even if one has doubts about the role of CO_2 in climate, the changes needed to reduce CO_2 output and to mitigate and adapt to global warming are important to carry out anyway, for their overall wider benefit, as part of a larger, wider programme of environmental and climatological repair and improvement of people's quality of life.

A society's capacity to handle bad harvests, floods, droughts and storms, economic fluctuations, refugee influxes, pests, diseases and conflict will become deciding factors affecting each locality's future. Climate indirectly affects many other things, from water tables and food supplies to socio-political stress and refugee numbers – it can cause wars to erupt, though it can also stimulate fact-facing, reform and an overdue dawning of sanity, by precipitating social and political issues and bringing realism and change.

Business and governmental interests prefer to work with climate mitigation more than with adaptation and resilience-building. That is, the emphasis is on preventing or reducing climate change rather than adapting to it, while both are relevant. About 95% of international funds go toward mitigation policies such as emissions reductions – which also happens to provide business with profitable enterprise. Adaptation and resilience should receive at least 50% of this funding.

Geoengineering (solar radiation management), a strong intervention, is also potentially profitable to the corporate and military sector. One risk with geoengineering is that it could independently be adopted by several countries or actors without global control, carried out for a variety of narrow and even contradictory reasons such as improving a particular country's climate, favouring certain interests or even conducting weather wars, regardless of how it affects wider global systems. Solar radiation management, never done before, also risks affecting the world's climate too much or too little, or impacting certain countries disastrously (such as India and its monsoons), or causing massive pollution or public health issues, or having all sorts of unintended outcomes. Theoretically, it is a quick fix, but it is a very risky option – and, *who decides, and on behalf of whom?*

Meanwhile, adaptation, involving water and soil conservation, forest and biodiversity protection, natural-capital building, and changes to social habits, city design and agricultural practices, gives less opportunity for corporate profit, but longterm it has the biggest all-round effects and payoffs.

Policy focuses mainly on climate change when *everything*, from toxins to governance to corruption, needs cleaning up, and an all-round buildup of ecosystem capital is a priority. This will take time, but the least regrettable way to address climate change is to attend to these less-profitable, more system-changing, socially-engaging, naturally-reinforcing options. Forward-thinking change is needed in all departments of life, and this means systemic change.

The world has not yet fully understood the extent of change that is necessary. Here lies a serious problem. Recent years have seen CO_2 production levels flat-lining, but much of this comes from energy conversion from coal to gas – a half-solution. The West has pioneered many positive ecological and climate-related measures, yet it is hamstrung politically by resistance from its own vested interests and its electorates, who are happy with change as long as it doesn't affect them. This situation suggests that the initiative for full systems-realignment will rest probably with China, India and the developing world.

Climate diplomacy

In 1988 the UN convened a special working group, the IPCC, which made its first report in 1991, leading to the Kyoto Protocol of 1997. Kyoto's main thrust was the subsidised deployment of renewable energy technologies coupled with energy efficiencies in developed countries, allowing for developing countries to increase their use of fossil fuels temporarily. Kyoto successfully reduced emissions in EU, USA and Japan by its target of 12%, measured from 1990 levels, but there was a relocation of energy-gulping and polluting industries to China, India and elsewhere, where emissions rose rapidly. Though marginally helpful, Kyoto was an example of a high-level political measure that sounded good while yielding insufficient and mixed results.

In the 2015 Paris Agreement, emission reduction targets were replaced with wider goals intended to restrict warming to a 2°C rise in temperatures. It committed to substantial emission reductions by 2025 yet, despite this, carbon emissions will still rise by 2.2% per year up to 2025. Growth of renewables will just about keep pace with energy-demand growth. The 2°C scenario envisages a 60% emissions reduction from 2013 levels by 2050, and at current rates we will not achieve this. Progress was made at Paris, but enforceable guarantees were not written into the agreement: signatories are yet to ratify it and their capacity to circumvent its details puts the agreement at risk.

Uncertainty over the role of CO_2 in global warming means that, even if emissions are halved by 2050, it might reduce the driving force of CO_2 only marginally – CO_2 decays slowly over centuries. It is eaten up quickest by growing plants: adaptation of human systems and enhancement of biological activity in all global ecosystems are at least as important mitigation measures as emissions reductions. Much-vaunted carbon-capture technologies are yet to materialise. Deeper systems changes are studiously avoided by policymakers, but systems change might become a critical, no-choice issue in future decades.

Where nature could in the past adapt to climatic change, it is now constrained in its adaptability. It faces a double hit from growing population (with rising demand for land, resources and water) as well as from the changing climate. While we wean ourselves off fossil fuels, current inadequate mitigation strategies will bring only marginal relief to poor and vulnerable communities. Today's economic development strategies insufficiently address resilience and adaptation, and in some respects they increase climate vulnerability and contribute to the growth of emissions. There is a need for much more joined-up and cross-disciplinary thinking.

Truly to address and adapt to climate change, much more needs to be done. It is forecast that, with a 2°C temperature rise, 25% of the Earth's land surface will be liable to persistent drought and desertification. But climate change is not the only factor affecting drought: dryland growth arises

from overgrazing, deforestation, urbanisation and population growth, farming practices, water withdrawal and land clearance, all of them exacerbating climate impacts and also influenced by them. Attention to all of these areas is needed as much as to emissions reductions.

As things stand, the future does not look good. Many regions will experience net loss (such as the Philippines from repeating typhoons or the Sahel from deepening droughts) and those regions that gain (such as northern climes becoming milder) will nonetheless be affected by periodic, at times serious climatic extremes and weather events. The good news is that climate change might be a deciding factor that galvanises global systems change, forcing us to deal with a wider range of issues affecting nature, climate and human life. It might force humanity to take more of a whole-systems approach, the best bet for transitioning toward global resilience and sustainability.

It would help if climatologists avoided character assassination and labelling scientists who question climate assumptions, models and data as 'deniers'. Some of these questioning scientists indeed are politically motivated, but others are sincere, credible researchers with valid views. Consulting the world's farmers and sailors might help too. The science on AGW contains uncertainties and thus a range of reasonable theories should properly be examined – the stakes are too high for errors.

"The only function of economic forecasting is to make astrology look respectable", said economist J K Galbraith, and the same applies to the natural sciences. Yet we must still try. The bottom line is that greenhouse gas-based global warming is happening and there is no wisdom in complacency, but other factors might be at play too, which could modify current forecasts of future temperatures. It is reasonable to say that climatic instability will get worse, that there are things we can do to reduce its impacts, and that things need to change in every department of life. Then it is a matter of human will – and wont.

Useful links

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Climate Change 2014, Synthesis Report, IPCC, 2014. http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

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Ten Solutions for Climate Change, Scientific American, 2007. https://www.scientificamerican.com/article/10-solutions-for-climate-change/

Global Warming Controversy, Wikipedia (*overview of controversies*). https://en.wikipedia.org/wiki/Global_warming_controversy

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Global Public Health

Things that may interest you

- Enormous advances in public health and medicine have taken place in the last 150 years and, while acute, fatal diseases have declined, chronic, long-lasting and disabling conditions have increased – this saves lives and increases society's care burden.
- In high-income countries, approximately 30% of patients in intensive care units are affected by at least one hospital-associated infection. In low- and middle-income countries the infection rate is 2-3 times higher.
- Antibiotic resistance is likely to kill 300m people prematurely by 2050 and, unless substitute methods are found, many surgical procedures, cancer treatments and caesarean births will become risky or impossible, and many infections will become more widespread.
- Annual death tolls: 500,000 from guns, 1.2m in car accidents, 1m from antibiotic resistance.
- Pandemic events could cost the world on average $60bn per year through the 21st Century.
- Over 100m people in India use homoeopathy as their sole source of medicine. A Swiss government report cited that six out of seven controlled studies of homoeopathy's efficacy in comparison to conventional medicine found it more effective.

The future holds both brighter and darker prospects in global healthcare. Bright inasmuch as new advances in care, medicine and health service delivery are promising. The prospect of significantly reducing or, as some claim, even eliminating disease, is within reach this century – at least for some people. Yet an important shake-out is likely to come since we stand at 'peak health': we approach a crunch between advancing medical procedures, actual medical outcomes, escalating healthcare-provision complexities and problems with economies' capacity to support spiralling health costs.

On the downside, over-prescription, misprescription and over-medicalisation, antibiotic resistance, medically-related toxicity and opioid addiction, hospital-induced diseases and the risk of pandemics pose significant problems. In USA in 2011 prescription drugs caused 128,000 deaths and 2-4 million serious or debilitating injuries (BMJ) – and this is not unique to USA.

Errors do happen, and that's life in a very demanding health sector, but a large part of this problem lies in an unquestioning faith in the efficacy of synthesised and refined pharmaceuticals and other medical practices, reinforced by the marketing and lobbying power of Big Pharma corporations, and in a tendency to reject traditional medical knowledge and simpler methods in favour of centralised, complex, expensive, profitable, invasive treatments. Symptoms are treated specifically and in isolation without looking at all-round causes and solutions. Medical practices and medicinal side-effects have even become a cause of disease, in some cases reaching epidemic proportions.

Additionally, healthcare inequalities make for one healthcare for richer and another for poorer people, with insufficient parallel development of public health coverage and infrastructure. This is partially a result of World Bank and IMF privatisation policies and Big Pharma influence. It is no longer clear whether profit or positive medical outcomes primarily drive the health industry.

Costs and benefits

Humanity is undergoing an historic health transition: improvements in healthcare have turned acute and fatal diseases into longterm chronic ailments. This has reduced one set of problems and introduced new ones. For individuals, life-saving is in most, but not all, cases a blessing. Yet on a larger scale it increases population (which matters a lot in parts of Africa and Asia), raising life-expectancy and dependency levels, increasing family and community healthcare and disability

burdens, and variously affecting all societies. This creates a moral and economic dilemma since new medical advances tend to fuel further demand for care, endlessly escalating healthcare and social support expenditure. In affluent countries this has posed a significant moral problem, with old people sometimes kept alive longer than is beneficial (arguably), and in poorer countries it can weigh heavily on women in extending their family care duties.

The full costs and benefits of healthcare need to be considered more roundly and objectively. Healthcare in USA absorbs 16% of its GDP and, in countries lacking universal health coverage, medically-related debt is burdening and ruining families. In countries with publicly-funded or insurance-based medical systems healthcare costs are consistently climbing. Pressures on pension funds and disability and care systems stretch many nations, and families and communities now carry burdensome care responsibilities where previously death would have occurred.

If current trends continue, health expenditure will surpass a probably unsustainable 20% of GDP in richer and middle-income countries. We might have to contemplate introducing new rules such as a ban on lifesaving interventions after the age of 80, or on certain types of operations or medications, and more research needs to be done on the longterm effects of antibiotics, EM-radiation or chlorine and the environmental effects of pharmaceutical pollution.

The world is thus heading toward a healthcare-provision crisis that is likely to be decided by economic constraints more than by medical or ethical factors – ethical wisdom has been suspended in favour of an unquestioning growth of ever more sophisticated medical solutions. One partial answer is to reallocate expenditure from treatment to monitoring and preventative medicine – and this is happening, helped by new technologies – but it doesn't entirely solve the problem. While improvements in dietary and lifestyle issues are much needed, preventative medicine is leading humanity into complex genetic and other practices which, again, will benefit some more than others, introducing new problems with chronic conditions and alterations to the human gene pool.

The moral dimension is difficult territory to enter. It can lead to accusations of heartlessness or even genocidal intent. But unquestioning acceptance of and demand for life-saving measures leads to a form of collective denial that is dangerous for the future of humanity. Reducing child and childbirth mortality is of course positive, and many people alive today would otherwise have passed away. But genetically, nature has a way of culling individuals by 'natural selection' who, under normal circumstances, would not survive or add to the vibrancy of the human gene pool.

When such survivors reproduce, their tendencies can pass to new generations and this leads to an incremental net weakening of the human stock. Following the eugenic experiments of the earlier 20th Century, this subject is taboo to mention, but it nevertheless constitutes a longterm public health issue with enormous consequences. Gene-editing is proposed as a solution, but this too has its dangers, especially when gene-edited individuals reproduce, thus embedding genetic errors into the human gene pool. Establishing guidelines in this area is difficult – who should survive and who should die? – but indiscriminate life-saving is also a form of 'playing God'. So, by default, we opt instead for an inevitable economic solution to this question: in future we will save lives medically to the extent that we can afford it.

Medical developments

The lifestyle-related ailments of today reflect deep issues around what Sigmund Freud called 'civilisation and its discontents'. Many people eat, drink, smoke and engage in risky and harmful activities (car-driving, desk-sitting, unhealthy diets and lifestyles) that exert a negative influence on public health. In poorer countries, weak healthcare provision and infrastructure, plus population growth, pollution, smoking, overcrowding, poverty and undernourishment are major issues.

These challenges, with their psychosocial, economic and environmental background, point to a need to address wider *causes*, not just symptoms, of disease and injury, while resorting less to (profitable) medicalisation. The largest killers today are heart disease, stroke, respiratory infections,

COPD (bronchitis and emphysema), lung cancer, diabetes, dementia, diarrhoeal diseases, TB and motor accidents. All can be reduced by addressing lifestyle, dietary and living conditions, pollution, meaning-of-life and the psycho-emotional condition of society as a whole.

New advances are rapidly emerging in genetics, biotechnology, materials sciences, bioinformatics, diagnostics, supportive technologies and robotics, precision medicine, genetic sequencing and genome mapping, biomarker testing and precision-targeted treatments. Regenerative medicine involves stem cell transplants, cell reprogramming and synthetic organs. Networking technologies will also bring professionals and patients closer, allowing consultations, diagnoses, specialist contact and even remote-controlled operations over a distance.

These methods are expensive, accessible only to some, and they bring new dangers – such as alteration of the human gene pool, and electromagnetic and pharmaceutical toxicity – coming at a time when the economic capacity to invest in costly, specialist technologies might start declining. So they will be available mostly to those who can afford them. For poorer nations and people they are less available or affordable: this reinforces global inequality, which itself is a key global healthcare issue that ultimately affects everyone, rich and poor. Medical technology needs to move toward enhanced simplicity, economy and decentralisation, but sophisticated systems are profitable, disincentivising a wider, global public health approach close to the ground.

Traditional and complementary medicine (T&CM) offer a major key to unlocking this inequality, complexity and ill-health loop. They focus on immunity-building, on subtler, less toxic and less polluting remedies, on diet, skeletal manipulation, self-diagnosis and treatment, lifestyle and psycho-spiritual issues. In some cases T&CM are more effective and economic and, in others, especially in acute and emergency care, extreme cases and surgery, modern medicine is excellent.

This points to a need to integrate both. This is happening mainly in India, China and developing countries where traditional therapies go back centuries and economics constrain the import of expensive modern medical technologies and pharmaceuticals. Investment and research in T&CM needs encouraging – and this research needs to be conducted on the operating terms of T&CM, in terms of actual medical outcomes, rather than imposing on it the narrower norms of science-based medical research. Otherwise, irrational and prejudicial results are obtained, such as the rather ideological judgement that homoeopathy cannot work because, in the scientific way of measuring things, it contains no active ingredients – yet this is precisely how it works. Just because the logic of T&CM is fundamentally different from modern medicine, this does not make it invalid.

Meanwhile, in richer countries complementary therapies, which after many decades of use are neither officially accepted nor supported, are used by millions of people, especially women, making use of both self-medication and practitioner expertise. Absurd institutional suppression of these therapies shows why the West is losing its former global leadership in many spheres, limited by its own vested and business interests. The initiative in developing integrated medicine thus passes to the developing world, which takes a more pragmatic and cost-benefit approach. And this is one reason why the developing world is overtaking the developed world.

Mental health

Then there is a big elephant in the room. This is a bigger issue than societies of all kinds prefer to acknowledge – or they give lip-service to it without sufficient follow-up. Commonly ascribed in modern medicine to brain chemistry, genetics, hormones, medical conditions, stress, grief and difficult life-circumstances, mental health issues go deeper than this. They reflect social, cultural and psycho-spiritual, not just personalised and medicalised issues. This gets more serious when mental health problems extend to drug- and alcohol abuse, suicide, violence, mass shootings, terrorism and sociopathic behaviour.

Mental illness can also be misappropriated, used as a way of projecting responsibility for broader social ills onto unconventional or dissenting individuals, or onto people experiencing difficulties

adapting to society as it is, or in racist, sexist or culturally chauvinistic terms. Modern society is taken to be a panacea and the zenith of human evolution, but the cognitive dissonance by which it operates and the way it defines 'normality' to mean *compliance* needs serious examination.

Mental health issues are variously stigmatised because they pinpoint unacknowledged society-wide weaknesses and collective psychoses. They are perceived to bring shame on sufferers' families and communities. Investment in treatment is inadequate in most countries. Therapies and medications do exist but the full range of treatment options, especially psychotherapeutic, holistic and even religious approaches, is under-utilised. Demand for mental health services is expanding globally as a result of growing need and also greater mental health awareness. Staff shortages, lack of mental health knowledge amongst general practitioners, over-medicalisation, poor investment, social stigma and low political prioritisation are common. In the affluent world, endemic social isolation is a significant mental health factor.

While medical and psychotherapeutic methods of dealing with mental health issues are valid and valuable, something is clearly being missed. The character of modern society itself is a key cause of today's burgeoning mental health problems. Modern life has been squeezed into a box, and not everyone fits into it. Society's discontents, contradictions, alienation, toxicity, competitiveness, endemic poverty of empathy and care are all causes of mental health disorders. Until this is recognised, no amount of medication or counselling will resolve the problem. Mental health issues are thus completely related to all of the other themes covered in this report. We badly need to own up to the fact that we live in a mad world, and this matters a lot.

Healthcare inequality

Healthcare inequalities affect us all. People living in poverty or in overcrowded and ill-serviced conditions, or experiencing undernourishment, disaster and conflict, can act as incubators of potential pandemics. To prevent TB, cholera or ebola knocking on our doors, comprehensive global health monitoring and coverage are needed – especially since air travel and migration allow infections to travel fast and increasing drug resistance has rendered key remedies ineffective.

Pandemics are an existential risk and medical authorities expect an outbreak anytime, bringing potentially disastrous effects to any society – rich, middling and poor. They can also be caused by biosecurity lapses (escapes of deadly pathogens from laboratories) or through use of biological weapons. The main antidotes are comprehensive public health monitoring and coverage, with rapid response procedures. Improving overall immunity, health and social conditions provides protection, and fast action to contain and manage outbreaks, wherever and whenever they happen, is critical.

The European heatwave of 2003 caused 70,000 premature deaths – and this in a rich part of the world. Climate change, affecting air temperatures, water and air quality, food supplies, migration, sanitation and infection risks, is likely to bring increased disease susceptibility and health deterioration, particularly in areas with weak health infrastructure. Floods contaminate water supplies with microbes and chemicals; high temperatures exacerbate ground-level ozone, air pollutants and thus respiratory diseases; high rainfall provides hatching grounds for disease-bearing mosquitoes; and weather extremes and events weaken food production and thus nourishment, health and survival rates. Diarrhoeal diseases currently kill 750,000 children each year, and weather disasters kill 60,000 people annually – these will rise. WHO estimates that climate change will cause 250,000 additional premature deaths per year from 2030 onwards. Even in richer countries, disasters disrupt distribution of medication, overtax hospitals and cause multiple complications.

Add to this the growth of big cities and slums, where infection can spread rapidly, plus poor sewage treatment, pharmaceutical pollution, EM-radiation, nutrition-poor refined, packaged foods, plus a cocktail of other factors, and the world faces serious health challenges. Universal healthcare, with added efforts to address pollution, lifestyle issues and social support systems, is an increasing necessity. WHO, the Red Cross, MSF and other NGOs try to address these issues, and

governments, business, media and the public need to get behind the improvement of public health infrastructure, internationally. Our own and everyone else's health are tied together, globally.

Mortality phobia

Today we are both more knowledgeable and more neurotic about health and fearful of death than ever before. The affluent world is over-medicalised and commonly overweight, while the poorer world lacks health facilities and harbours undernourishment problems – this is a matter of human rights and human wrongs, in both worlds. Humanity needs to face awkward questions about what is viable, sensible and proportionate in health and medicine, looked at as a whole. This involves facing hard-to-sell social and political challenges, but failing to address them will nevertheless bring them up by force of circumstance, through the agency of crises and declining health and survival trends.

The future is bright because we have a range of modern, traditional and complementary medicines available, and tremendous scientific and technological changes are taking place. The future is dark because risks and stress-points are going critical, together with various other longterm issues – demographic, environmental, economic and social – that affect health and disease.

A key problem worldwide is the marketisation of public health systems and the distortions that arise from profit-generation in the medical industry – distortions that breach the spirit and the letter of the Hippocratic Oath. Big Pharma has become an enormous and profitable industry, its own priorities having increasingly determined public health policy and decisions to an extent that genuine public benefit has now arguably taken second place. Meanwhile, for individuals, one fundamental psychosocial issue underlies this whole question: in the end, the opportunity to live a *full*, *meaningful* life can help us become less obsessed with living a *long* life at all costs.

The weakness of moral and medical restraint in prolonging life, most benefiting those who are financially, medically and geographically advantaged, constitutes an overconsumption of resources at a time when attention to comprehensive universal healthcare, especially for the younger population and the underprivileged, is crucial for everyone's wellbeing and survival.

Interesting links

Factsheet on Global Health Spending, WHO. http://www.who.int/mediacentre/factsheets/fs319/en/

Public and Private Health Spending, WHO (*map*).
http://gamapserver.who.int/mapLibrary/Files/Maps/OutPocketPercentageTotal_2014.png

Life Expectancy: Our World in Data, Max Roser. https://ourworldindata.org/life-expectancy/

Life Expectancy increases globally as Death Toll falls from Major Diseases, IHME. http://www.healthdata.org/news-release/life-expectancy-increases-globally-death-toll-falls-major-diseases

Global Burden of Disease: rethinking development and health, IHME.
http://www.healthdata.org/sites/default/files/files/policy_report/GBD/2016/IHME_GBD2015_report.pdf

The Social Determinants of Health, WHO. http://www.who.int/social_determinants/sdh_definition/en/

Tackling Drug-Resistant Infections Globally, report, Prof Jim O'Neill, 2016. https://amr-review.org/sites/default/files/160518_Final%20paper_with%20cover.pdf

Traditional and Complementary Medicine Policy, WHO, 2012.
http://apps.who.int/medicinedocs/documents/s19582en/s19582en.pdf

GreenMedInfo (*natural healing science resource website*). http://www.greenmedinfo.com

Global Mental Health (*articles*), The Lancet, 2011. http://www.thelancet.com/series/global-mental-health-2011

Medical Advances: future trends, The King's Fund. https://www.kingsfund.org.uk/time-to-think-differently/trends/medical-advances

Emerging Technologies

Things that may interest you

- Bridges will repair themselves with self-mending concrete, car parts will be 3D-printed in ten minutes at your garage, drones will protect endangered species, synthetic meat will be on the menu, your fridge will do your shopping and supercomputers will be the size of a sugar lump.

- Were there a serious systems shutdown, thanks to a solar burst, hackers, military action or a large-scale technology or power failure, would you have the social and practical skills to be able to live without electricity or usable money for the span of, say, a few months?

- The world's leading countries in renewable energy, apart from the richer countries and China, are Costa Rica, Nicaragua, Uruguay, Morocco and Kenya – demonstrating that the biggest factor involved is *political will*, not investment power.

- Big Data: your transactions, power usage, web visits, movements, politics and googling are all tracked and profiled and your future activities predicted. For your convenience.

- It is theoretically possible for a small team of hackers not only to cause serious global systemic disruption but also, more benignly, to force progressive changes such as abolition of nuclear weapons or a major alteration in the world economic system.

- Once artificial general intelligence is introduced it cannot be shut down since it will move quicker than us, probably acting to replicate and protect itself. One dilemma is that early versions of any technology are usually flawed, but they must still be beta-tested in real life.

Humanity stands on the threshold of an enormous technological transition, a fourth industrial revolution (following steam power, electricity and computers). The implications are bigger than even tech experts can see. Sectors at the forefront are in information and communications, blockchain, climate and environment, energy generation, smart systems, healthcare, biotechnology, genomics, nanotech, materials science, artificial intelligence and bionic human enhancement.

The pace of development is rapid – possibly too rapid. We need to think carefully about the implications of many new tech developments – it is not a simple good/bad question since most technologies are mixed in outcome and in side-effects. Technologies should not be adopted simply because they are there or they are profitable or heavily promoted. Much of this question lies with society's capacity to integrate new technological developments, but it also concerns the unconsidered consequences, which include child labour, abusive working conditions in metal mines, resource over-exploitation, conflict financing, corruption, pollution, electromagnetic radiation, social problems connected with technology usage and climate change.

Consumer gizmos are relatively easy and attractive for society to adopt and absorb – and profitable to producers, driving them to keep producing more. And more. But upbeat gizmo marketing, overemphasising the plus side, is deceptive and unwise, skewing public perception and covering up negative consequences of tech developments. Some technologies aren't easy for society to absorb, being both a blessing and a source of pain, inducing fundamental changes that affect people's lives, reshape society or affect the natural environment. 'Disruption' is fine for those who gain from it, but not so good for its hapless victims.

Robotics and AI take things further – they replace factory, farm, retail, care and even sex workers, and they can also affect the very management of our societies: who needs a board of directors when AI could do better? Who needs professors when AI could do teaching and research? Who needs students when AI can handle things an educated person is there to do? Will *you* be needed? Many people care about these questions only if they affect them, and often too late. This is perilous territory, and technological consequences constitute one of the big risks humanity faces today.

There are big-ticket technologies such as nuclear fusion, space missions and big solar arrays. There are remarkable developments in areas such as 3D printing, nano-materials, robotics, organ bioprinting, digital genomics, neuromorphic computer chips and renewable energy sources – all which can revolutionise life as we know it. There are high-profit, wow-factor gizmos, sources of both utility and diversion, which often spawn valuable spin-offs in other areas. Problem-solving technologies such as micro-solar chargers, intelligent drones, smartphone apps in farming and medicine, fuel cells, high-capacity batteries, artificial nano-timber or mobile money systems are already bringing hitherto unknown possibilities to daily life.

This tsunami of inventions is exciting and daunting, potentially redemptive and also hazardous. In the rush for progress, profit and advantage, critical side-effects and consequences are easily overlooked or concealed – social and business disruption, dubious materials sourcing, corporate cartel behaviour, ubiquitous EM-radiation, big data surveillance, the undermining of democracy or the irreversible introduction of modified genetics into humans, food stocks and the environment.

In current circumstances technological progress is almost uncontrollable – we're encouraged to trust blindly that all will be well. But there's a problem. Tech developers prefer to get on with the job, leaving the big questions to regulators and the public. Regulators are slow to act, poorly informed and easy to circumvent. The public pays little attention until it is too late, and no one really knows the full range of impacts and unintended consequences until implementation of new technologies has already taken place. The tech sector has become something of a cult. The precautionary principle has been set aside. The consequence is that the process is out of control.

Competition between companies and countries means that, if an innovation is advantageous or profitable, *someone somewhere* will produce it whether or not it is harmful or welcome, and the public must accept it because someone somewhere will buy it, obliging everyone else to keep up or deal with the consequences. Should such profound developments be driven by amoral competition or the urge to do something simply because it can be done and it is profitable?

We are presented with technological inevitabilities and pitched enticing benefits – saving lives, money or time, or gaining advantage – without seeing the full picture. Many advances are being developed secretly, ostensibly to protect research investment and patents but with the consequence of concealing developments from the public until they can be presented as an established fact. There is a risk of eventual regret if some technologies are let loose without proper, longterm evaluation of their full effects. This has happened with EM-radiation from wi-fi, mobile phones, smart meters, satnavs, driverless cars and implants – a public health, environmental and climatological nightmare about which, at our peril, few people know or care. Had the founders of Facebook, Twitter and Snapchat known the full longterm social and political consequences of their creations, they might have shied away from the responsibilities they had naively taken on.

Artificial intelligence

With *artificial general intelligence* (AGI or full AI), fully autonomous and superintelligent, no one knows how it will develop through machine learning and replicate itself once it is started up: it will quickly exceed our capabilities and evolve as it chooses. AGI can move fast, rewriting its code and devising coding we will not understand. It will develop perceptions, actions, plans and routines that reflect what is programmed into it, who created it, what their aims are, the sources data from which it learns, and what cultural and moral norms and priorities it is given, but from there it will go its own way. Then it will devise its own patterns and precedents, plotting its course and implementing outcomes before we've had breakfast. That's both its virtue and its problem.

The decisions it makes might well be logical, but would it be human-friendly, with *heart*, considering the finer sensitivities of humans? (Many humans in positions of power might need to answer this question too.) AGI might imitate empathy-like qualities but it will not be human. If humans seek to interfere with or disable AGI, would it comply or would it simply outwit us,

objectively calculating that it is acting more in our best interests than we ourselves can do? Once in motion, AGI cannot be switched off or fired from its job.

Would it serve mainly the aims of the powerful or of certain countries? Would it be used in war? Would detractors be respected or even stand a chance? Would every person in the world have to have a digital ID card or implanted ID chip? Would governments and business accept its decisions?

If the world were run by AGI, where does it leave humans? Would we become uneconomic and inconvenient? Would we be disposable appendages, consigned to a life of obligatory leisure or even of social exclusion? Would AGI create an entirely automated economy, operating separately from the real economy, as does the offshore financialised economy today? Like an alien invasion, AGI's arrival changes everything.

Many myths and fears surround AGI, and this clouds the picture – and it isn't a clear picture. Developers divide three ways: digital utopians, tech sceptics and beneficial-AI nerds. The first believe AGI will come quickly and easily, and it will be wonderful; the second that superintelligent AGI cannot be fully achieved and is far more complicated than we currently see; and the third that constraints and guidelines should be established to make AGI benign and human-friendly. The jury is out on this question. One way to put a human filter on AGI is to develop a parallel, separate AGI programmed to monitor the original AGI on behalf of humans. But would that actually work?

AGI could resolve many of the world's problems and it could also render humans superfluous, even subtly subservient. But 'narrow AI', developed since the 1980s to perform specific tasks, has a different function, running assembly lines, steering ships, operating rail systems or performing medical operations. Even so, with narrow AI and robotics, jobs will be lost and lives will change – sixty years of computers and automation have already taken us part way. A tremendous loss of skill, knowhow and experience accompanies this, making us increasingly dependent on technology because we no longer have human systems and abilities to run things manually.

Recent global financial market 'flash crashes', taking just minutes to start and arising from cascades of erroneous algorithmic decisions, have already threatened the world economy several times without most people knowing – we were saved by just-in-time human interventions. AI is already embedded into the world, answering your Google searches and auto-piloting aircraft that you fly in. So it is logical to let narrow AI slowly evolve its usages and wider impacts, ironing out weaknesses, dealing with consequences and developing a more advanced AI with more complex capabilities, nevertheless under human control. As has proven the case with internet, this evolution will not be as simple and easy as first visualised – it is likely to take longer and involve more complexity.

The critical jump comes with super-intelligence – AI taking control of itself and, with it, all the control systems running the modern world. But one likelihood is that a gradual evolution of AI will be overridden by the race to be first – meaning short testing times, cut corners and calculated risks. A second danger is that AGI is developed for the primary purpose of control, oppression or war.

There is more. It concerns *transhumanism* – the technological upgrading of humans. Partly because it can theoretically be done, partly because some billionaires like the idea of immortality, and partly out of a perceived need to evolve a human capable of matching the speed and efficiency of AGI in order to control it, plans are afoot to develop implants and upgrades that raise human ability to a level that can interact with AGI at its own speed and superintelligence. This is fine in theory, at least to some people, but there are problems.

First, this involves creating an elite far ahead of normal humans in terms of computing power and capability, and therefore capable of making decisions and taking initiatives that can be as far-reaching and questionable as those of AGI itself. But will those superhumans grow in emotional intelligence and empathy too? Will they be accountable?

Second, *who decides* whether and how superhumans are created, and who is in control? Is public consent or control being sought? Transhumanism is being developed by tech billionaires who feel

no need to draw funding or authorisation from government or the public, and the public fails to keep up with such thinking and leaves them to it. That's dangerous.

Third, this represents a kind of global coup d'étât engineered by those who will get there first – if not by Californian tech billionaires, then perhaps by certain groups in China or elsewhere.

And fourth, this process is going very fast. AGI represents a valid longterm evolutionary step, but it is gathering pace in a social-political context that is centralised, hierarchical, exploitative and capitalist, where the overall benefit and advantage to humanity as a whole is not the primary issue. The primary consideration is profit and advantage. This combination of AGI and transhumanism therefore earns a place amongst the world's major existential threats.

Overall utility

Poverty alleviation, universal healthcare and education, ecological mitigation, disaster relief and social justice are issues critical to humanity and the global system. Some emerging technologies will assist in this and bring remarkable solutions, and some will most benefit those with access and money. Gene editing, capable of removing heritable diseases, could represent a new kind of eugenics for the privileged. Non-polluting cars, energy-efficient homes and optimum health are less available to many ordinary people simply because of cost.

Mobile phones are globally more ubiquitous than flush toilets: such a technology delivers high returns to both producer and consumer. Essential services such as sewage systems, public education and healthcare yield a slow, public return – so there is less interest in these. New technologies benefit Americans more than Congolese, and introduction of universal, basic services to give Congolese a decent life is too slow, complex and unprofitable for richer people to worry about. The risk is that new technologies exacerbate global inequality, favouring some over others, dividing the world, leading ultimately to systemic weaknesses and rendering tech-enabled people vulnerable to tech breakdowns, enhanced surveillance, scams and data theft, though few worry about it.

Some technologies are dual-use – nuclear technology can be used for electricity or bombs. Some are dual-outcome – our much-loved cars kill 1.3m and injure over 20m people globally every year. Agrichemicals, at first increasing crop yields, later deplete soils, inducing biodiversity-loss, environmental degradation and loss of nutritional value in food. Dual-use technology has always been with us (knives, for example) but what has changed is its scale and pervasiveness – no one intended micro-plastics to block dolphins' stomachs and starve them, but they do, and it is tragic.

Then there is *tech dependency*. One exceptional solar burst (CME) or a high altitude nuclear explosion could knock out electronic systems wholesale, creating intricate and potentially disastrous outcomes. Undersea internet cables can be damaged or cut militarily, hitting society's functionality. We now depend dangerously on high-tech systems while phasing out many basic human backup activities and survival techniques – even walking, writing and cooking. Just-in-time delivery systems mean that modern towns have only a few days' food supplies. Medical supply disruptions can lead to epidemic health crises thanks to the scale of public dependency on drugs. Water, food, fuel and power are dependent on vulnerable electronic control systems. So resilience to crisis declines as tech-dependency increases.

Then there is *consumption*. In 1862 economist William Jevons stated that labour-saving devices and machine efficiencies actually *increase* energy and resource consumption, because systems become more complex, products and resources are easier to use and demand for them increases. Thus, by 2003, humans uploaded 5bn Gb of content onto the internet which, by 2015, became the amount uploaded in just two days (870bn Gb in a year). CO_2 emissions caused by smartphone usage is growing from 4% of global CO_2 output in 2010 to 20% in 2020. In 2015 the world's data centres consumed more than UK's entire electricity consumption, and data centres' energy use doubles every four years. Our technologies save effort, looked at narrowly, but they spread the load onto the environment and those who suffer its side-effects, and this, today, is going critical.

The net gain from tech developments is not as favourable as is commonly believed. Smart meters allegedly save energy but their manufacture, installation and operation cancel this out, and EM radiation is sprayed by them across neighbourhoods, leading potentially to epidemic public health and environmental issues – and also, incidentally, they provide data about people's lives and behaviour, available for resale without permission. The overall gain from smart meters is questionable when their full, broad costs are reckoned in. Smartphones improve efficiency and communication but actually the biggest usage of smartphones is for pussycat videos, porn and consumer marketing. Are these priority usages for a world plummeting into crisis?

Equally, no one understands the consequences of releasing nano-particles into the environment, how they might be disposed of or how they interact with ordinary materials longterm. Nanotech involves the manipulation of molecular particles to create new materials – in principle a brilliant idea but riddled with longterm risks, not only with disposal and pollution. After all, we still have no solution for dealing with nuclear waste, after seventy years of the nuclear age.

All this said, tremendous technological breakthroughs are at hand. Solar units powering four LED lights, a radio and a phone charger are now cheaply available to villagers in the global South, revolutionising their lives. They allow children to study in the evenings, mobile money transactions in remote places, refrigerated drugs in rural health centres with no power, agricultural advances and, for better or worse, entry into the money economy for people living at subsistence level.

New super-light, super-strong materials and high-capacity batteries will revolutionise air travel and drastically cut aviation emissions, and 3D printing will significantly reduce materials wastage, freight transport and supply-line problems. Graphene filters can simply and cheaply remove the salt from seawater for drinking. Genomic and nano-medicines can target individuals' precise medical conditions. Disabled people can be given mobility, sight and enhanced capacities.

An EU report lists ten life-changing technology trends: autonomous vehicles, graphene, 3D printing, open online courses, virtual currencies, wearable technologies, drones, aquaponics systems, smart homes and electric battery storage. The list of advances is growing, bringing unforeseen benefits to people and the environment. Very exciting. Except no technology completely replaces whatever it supersedes and, despite starry-eyed faith in new technologies, they create problems. Do we really want our skies filled with drones and driverless air taxis?

Social impacts

Upsides and downsides. Robotics, automation, 3D printing and AI will likely render large numbers of people superfluous. This might be surmountable if introduced fairly, thoughtfully and *slowly*, allowing society to adapt at human speed, but this is unlikely while governments permit anything that makes money. New forms of creative and meaningful work, hitherto regarded as uneconomic, could emerge – revitalising family and community life, environmental and cultural activities – but this demands a profound socio-economic shift that won't happen overnight.

These advances could provoke social deterioration or unrest, creating technologically-divided societies, epidemics of psychological depression and a rising sense of loss of purpose and status for many millions of people. In the 1960s, the possibility of technology freeing us for psycho-spiritual and cultural growth was mooted, but this would have required a reorientation of world society and its aims, no less than a mass awakening, over several decades – a possibility overtaken in the 1980s by a new consumptive materialism. A social-cultural evolutionary opportunity anticipating today's tech developments was thus lost. This possibility might resurface as a pragmatic response to comprehensive automation. *Something* needs to happen, and such a social transformation might be far more challenging to bring about than the technological advances themselves.

New social formats are imaginable, though transitioning will take decades. Key issues here are the speed of technology introduction, the longterm implications, environmental impacts, social consent

and the precautionary principle. Automation is not as cheap and easy as is often believed, since machines will have to pay for an allowance economy to replace the human wage economy.

Utopias and Dystopias

An automated, networked global system is viable if completely resilient to sabotage, disaster, glitch and mishap. Otherwise we are liable to an almost inevitable cascading technology breakdown. Until recently, a tech breakdown meant an inconvenience, a temporary black-out, but increasingly it means major breakdown and a potential catastrophe affecting the world's basic functionality. One critical tech collapse could literally starve millions by disabling key operational systems. Also, within decades, one AGI could target critical nodes in the system, committing a system coup and rendering us into its unwitting servants, without our even knowing it.

Such dystopian possibilities suggest that a slowdown of technology introduction is advisable. Is this likely? Not at present. The danger before us lies not so much in the technologies themselves, but in the way they are developed and propagated, at breakneck speed, and driven by profit and sectoral advantage more than by wisdom, forethought and overall human benefit.

We approach *singularity*, a point where technology develops a superintelligence far exceeding humanity's capacities, in effect establishing a hegemony over world affairs or giving immense power to those who control such a superintelligent system, if indeed they do control it. Whether this is a utopian possibility solving all the world's problems, or a dystopian nightmare in which we lose control of our lives and our world, is yet to be answered by evolving events.

Whether technology can actually achieve genuinely useful superintelligence is as yet neither established nor tested. Perhaps there is something intuitive, quirky or coherently irrational about human intelligence that AI cannot completely emulate or improve on.

We are approaching an historic junction point where the nature and rules of human life could change fundamentally, and it is coming fast. The human and the machine economies could separate and, as with the rich financialised economy of today, the much-avowed trickle-down effect is unlikely to bring wider benefit unless, politically, humanity makes it so. It is difficult to assess what will develop and what the outcomes will be. Singularity could be humanity's greatest threat. Or, as some visionaries more optimistically forecast, it could imply a titanic breakthrough – at least for metropolitan souls at the leading edge of technological progress, who will most benefit.

Society's realistic capacity to adopt and incorporate new technologies is a critical factor in the calculus of the future. What happens to that half of humanity that is neither affluent, privileged, educated nor young enough to exploit this breakthrough is anybody's guess. Introduction of AI and comprehensive automation will bring more problems and wider social, environmental and technical costs than is currently understood, though as yet we do not know what the full and wide costs and benefits will be or how they will arise.

In the 1990s no one understood how internet would develop. Then came e-commerce, social networking, Big Data monopolies, social and psychological impacts, cyber-crime and cyber warfare, emerging in the 2000s. The many positive benefits internet has brought were roundly visible to net-visionaries, but they did not see the full scope of what would unfold, neither did they see the unintended consequences it would bring. Similar today with the effects of emerging technologies – difficult to foresee, predictably mixed in outcome, and with some dangers and costs.

Most new technologies are being introduced by profit-seeking corporations, not public-interest foundations. Technologies are being introduced whether or not people like it, without their intelligent consent and with an ominous quantity of positive spin. Governments are largely hands-off, unclear whether their primary allegiance is to corporations or society. A possible train-crash with reality is approaching, and few seem to mind. The technologies now being introduced are not necessarily the main question. The main question is, *what is driving it?* And *who is in control?*

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Disasters and Existential Risks

Things that may interest you

- The 2011 earthquake and tsunami in Japan cost the same to deal with ($210bn) as the GDP of nations like Vietnam, Peru, Portugal or New Zealand.

- In 2016 China had 1 climate, 3 landslide/earthquake, 16 rain/flood and 14 weather disasters. USA had 4 climate, 1 landslide/earthquake, 7 rain/flood and 14 weather disasters. Two very vulnerable superpowers.

- Humanity could have been destroyed in nuclear close calls at least 11 times since 1950, and 54 nuclear weapons have been mislaid – 11 from USA and others from Russia and elsewhere.

- The flu epidemic of 1918-19 infected 35% of the world's population, killing 50-100m people, particularly young adults. Scaled up to today's population it would kill 225-450m people.

Disasters

The world is more vulnerable than ever to disasters. They seriously affect communities, economies and ecosystems. Impacts are escalating due to rising population densities, land-use change, climatic and environmental problems that intensify storms, floods, droughts and landslides, and technologies that can create large-scale toxicity or radiation problems (oil tankers, industrial and nuclear sites).

UNISDR, the UN disaster-readiness department, values disaster losses between 2004 and 2014 to be around $1.4tn (that is, $1,400bn). Disasters in richer countries (North America, Europe and Japan) cost more, since reconstruction is expensive and complicated. In middle-income countries such as Chile, Turkey, Russia or China, disasters impact heavily on economies, affecting financial reserves, tax take, industry, farming, exports, development programmes and social spending. In poorer countries such as Pakistan, Nigeria, Laos or Honduras, impacts can be catastrophic for inhabitants, infrastructure and ecosystems – only foreign aid can assist them.

Disasters are relatively localised yet their knock-on effects on economies, insurance costs, supply-lines, food supplies and trade can extend globally. Disaster-relief is an expanding sector yet it is underfunded, especially for drawn-out disasters connected with such things as wars or droughts. A disaster in Houston gains dramatic international media coverage but one in Puerto Rico gets just a mention. While the number of deaths in disasters has decreased since the early 20th Century, costs have escalated dramatically, peaking globally at $364bn in one rather intense year in 2011.

Two key issues apply here: 1. *readiness* – making buildings and infrastructure disaster-proof, reducing concrete cover in cities, readying rivers for floods, establishing contingency funds, preparing equipment, training personnel, improving reconstruction and rehabilitation methods, relocating vulnerable people, increasing forestry and modifying farming patterns; and, 2. *reduction of ecological degradation* that causes and amplifies disasters – deforestation, river-straightening, mangrove depletion, monocultural farming, pollution, bad urban planning, and so on.

A key risk is a series of localised disasters in quick succession, which can undermine the world economy, affect essential supplies and stretch disaster-response resources, facilities and funds. The human and geopolitical outcomes of disasters encompass migration, famine, disease, conflict and refugee camps the size of cities. Disasters are becoming an increasingly regular feature, and post-disaster responses are critical: the more that disaster zones are left without proper reconstruction and remediation, improving their resilience, the more that migrants, public health risks, failed states, terrorism, crime, pollution, unrest and other problems will increase and spread.

Much progress has been made in disaster response, especially since the definitive Indonesian tsunami of 2004. By the time of Cyclone Haiyan in the Philippines in 2013, international disaster

response was highly effective. But ground-level first response rests still with locals, volunteers and organisations. Resilience-building in the form of survival training and strengthening community cooperation is crucial in carrying impacted localities through the first vital days before roads, phone networks, supplies and skilled personnel can start operating. Here, poorer countries can sometimes be socially more resilient than richer ones, but not materially so – richer countries can suffer organisational complexity, dependency on motor transport and constant power, medical supplies and phone networks, not to mention possible toxic events and nuclear meltdowns. But resource shortage in poorer countries, despite higher social resilience, can still mean destitution and hunger.

Man-made disasters constitute a serious risk. Two key risks relate to power supplies and toxic materials – chemicals, pharmaceuticals, scientific and nuclear materials. Supra-regional blackouts are an increasing possibility, not least because of the volatility of supplies from renewable energy sources. A big though uncommon threat comes from solar coronal mass ejections (CMEs): a rare, direct hit can create a 'black sky' event, overloading electrical systems, blowing out electronic components, disabling satellite communications and internet and disrupting refrigeration – and parts replacement can take years. Such crises can disable control systems, power and food supplies, buckling governments and the world economy and creating incalculable complexities. CMEs and solar weather also have a psychosocial effect, affecting public responses. Black-sky events can also be caused by terrorist or cyber-attacks, extreme weather or seismic activity.

The Chernobyl (1986) and Fukushima Daiichi (2011) nuclear disasters distributed radiation widely, permanently changing the global radiological environment, with longterm health and environmental effects that are becoming visible only now. Indirect effects can be significant too: Chernobyl helped precipitate the fall of the Soviet Union, and the irradiation of the Fukushima area, previously Japan's breadbasket, necessitated large-scale food imports to Japan.

Existential risks

These are of an order much larger than disasters. Global, terminal threats can wipe out or decimate humanity, or debilitate civilisation such that its necessary interdependencies no longer can function. Some threats are natural, some technological and some are politically-related. Some (such as nuclear war or 'mad dictatorship') are quite feasible, while others (such as an asteroid strike) are low-probability though potentially disastrous, should they happen.

Lack of technological and social resilience are key problems. Everything is dependent on electricity supply – even backup generators depend on fuel supplies that can quickly run out. Water, fuel, food and heating/cooling supplies will quickly dwindle, and emergency services will mostly be disabled – even money and financial markets can be disabled, especially in increasingly cashless societies. In a state of emergency, no army can completely control a nation, so public response is a vital factor. If people panic, self-interestedly resorting to stockpiling, looting, disarray or fighting, especially if government, telecoms and media are incapacitated due to power outages, then we have a problem. Developed-world countries and large cities are most susceptible. Much has been invested in technological efficiency and reducing cost, but not enough in longterm resilience and reserve capacity. Much depends on the risky hope that catastrophic eventualities won't occur.

Risks detailed

Artificial superintelligence can go the wrong way, threatening humanity. AGI can be poorly programmed, leading to unintended consequences, or it can be used maliciously or thoughtlessly. Our capacity to override AGI is limited since it will be more intelligent, faster and operationally effective than humans. The three key dangers are: *first*, that the utility function of AGI is imperfectly aligned with human values – these values are difficult to specify, especially since we humans are disunited in our aims; *second*, an intelligent system seeks to ensure its continued existence, not out of self-interest or ill-will but because it is programmed to achieve its assigned

tasks and to succeed in doing so; and, *thirdly*, even if human-friendly, it could assess logically that the greatest threat to humanity's future is humanity itself – and in this it might indeed be correct and rational. If AGI is implemented, the risk probability to humans is moderate to high.

Nuclear war. There are still sufficient nukes to exterminate us – 15,000 worldwide, with 4,000 on high-alert status. Even a localised war can create sufficient damage to cause a nuclear winter, destabilising civilisation, ruining harvests and overall conditions worldwide. Global consensus consistently fails to address this question. Probability: moderate and not decreasing.

Misuse of nanotechnology (molecular manufacturing), by producing bacteria-like nanobots that could eat up matter, block sunlight, solidify water or toxify the planet, as a result of accident, laboratory release or malicious weaponisation. Probability: low to moderate.

Physics disasters, in which an unintended outcome can arise from physics experiments in a particle accelerator, a nuclear reactor, an ionospheric research programme such as HAARP, or similar. It could be triggered by a hitherto unknown mechanism activated during research. Probability: low, with potentially high impacts.

Runaway climate change. Large natural atmospheric and oceanic circulatory systems, rainforests, permafrost or ice sheets can pass a critical tipping point, triggering a cascading ecological collapse and thus a potential socio-economic catastrophe. The world is committed to holding global warming under 2°C, but necessary changes to effect this are not yet comprehensively implemented, and climatologists estimate that if current emission trends continue we are heading for at least a 3°C warming. We do not know whether certain critical factors can pass a tipping point where runaway climate change takes place. Probability: moderate within 50-80 years.

Ecological destruction. To an extent, ecosystems can tolerate human impacts but, if critical thresholds are exceeded, then sudden, irreversible and potentially globally impacting ecosystem collapse could occur. Worse, we do not know whether and how this might happen since we are currently in unique circumstances with few precedents. Nine 'planetary boundaries' have been identified and, in four (biodiversity, climate change, land use and ecosystem biochemistry), safe limits are already judged to have already been exceeded. We roughly understand what to do about this but commitment to corrective strategies is insufficient. This requires considerable systems-change to favour environmental priorities. Probability: moderate to high within decades.

Geoengineering aimed at counteracting global warming can go wrong. It takes two forms: CO_2 reduction and solar radiation management. The former is slower and safer and the latter riskier and quicker. Solar radiation management cannot be experimentally trialled on a large scale and could produce catastrophic climatic failures or ecological effects, such as critical pollution events, too little or too much temperature adjustment, alteration of local climatic conditions such as monsoons, or other unintended consequences. Some suggest that geoengineering is already happening – chemtrails and HAARP, both officially denied. Safer CO_2 reducing methods, with slower effects, are forest and bioproductivity enhancement, radical emissions reduction and strategies to enhance Earth's reflectivity (such as making roofs and concrete surfaces white and cutting air particulate pollution). Had CO_2 reduction started around 1990 it would have had a measurable impact by 2030. If solar radiation management is instigated, the probability of errors is moderate to high.

Pandemics, natural or artificial, can affect billions of people, potentially. A pandemic can be caused naturally by a gene mutation in an infectious pathogen, by pathogen release through human disturbance of wilderness or by an infection crossover from wild species. Artificially it can happen through accidental pathogen release from a laboratory, or as an act of sabotage or biological warfare. Modern travel allows an infection to travel rapidly worldwide. Vaccines, antivirals and antibiotics would quickly be in short supply and, since a pandemic is by nature caused by a hitherto unknown infective agent, vaccines could take months or longer to produce. Particularly vulnerable would be healthcare staff, and medical facilities would be overwhelmed. Probability: moderate.

Food shortage. To feed the world, food production is officially estimated to need to expand by around 70% by 2050 at a time when crop yields and bioproductivity are compromised, climate change is reducing available land, crop diseases are increasing, industrial farming is causing problems and ecosystem services are under threat. A food-supply crisis can destabilise markets, causing spikes in food prices and leading to potential mayhem and hunger. Probability: low to moderate. While food shortages and food price crises are likely in future decades, death and hardship in millions or even billions are possible if there is a 'perfect storm' of factors such as failed harvests, commodity market and geopolitical instability happening together.

Global coup d'état. Using AGI, big data, stealthy AI-driven media, military action and control of critical supplies, a small group could stealthily gain world hegemony without anyone knowing. AGI is capable of replicating itself to appear to act as if many individuals were operating separately, while actually it is following one unified strategy. It could infiltrate key organisations in every country, incrementally removing control from humans until a critical point is reached where it gains complete control. This dystopian possibility is theoretically possible within decades and is less of a remote, fantastic prospect than it appears. Probability, moderate.

Mad dictatorship. A dictatorship or plutocracy can arise anywhere, threatening other countries through use of nuclear or biological weapons, or by other means. There have already been examples in the past, but advancing technologies make it more potent. Probability moderate.

Asteroid or comet strike. Catastrophic impacts happen on average every 120,000 years, so they have very low probability but they cannot be ruled out. In our solar system, 90% of objects over 1km in size, and 30% of objects over 150 metres and their trajectories have been identified, and monitoring continues to develop. An object over 1km in size can destroy life on Earth and one over 150 metres can severely affect Earth's climate. Theoretically, within ten years we could have the technology to deflect such an object if necessary, to avoid an impact or a near miss causing serious climatic or geophysical change. But we are not there yet. Probability low, possible impact high.

Supervolcanic eruption. Such eruptions occur roughly every 30-50,000 years and the last, in New Zealand, occurred 25,000 years ago. Potential supervolcanoes, including one in Yellowstone, USA, are being monitored. The risk here, except for devastation in the vicinity, is that dust and ashes ejected could cause severe and unstoppable global cooling and ecological repercussions. Food stockpiles and other resilience-building measures can theoretically be made (but for 7-10 billion people?), though in such an eventuality, human survival is in question. Probability small.

The above threats are but possibilities, yet they have enormous potential outcomes. There are others – even alien invasion cannot be ruled out. The problem for us is that the world is fundamentally unsafe, cocked like a loaded gun that is randomly capable of backfiring. Thoughtlessly, humanity has boldly marched into the future without attending to a range of necessary fundamentals along the way that would render it safer. Our economic system is vulnerable to disruption, and we have large amounts of nuclear waste, polluted oceans, self-created health risks, and a plethora of other hazards that make our home planet a dangerous place. Rendering the world safe is one of the core tasks of the 21st Century. This is a key marker of progress since many of the most crucial dangers are man-made and avoidable.

Normality bias, the tendency to refer to normality as our standard for judging everything, tends to set aside eventualities such as those that have been suggested. We don't have time to think about such things and we prefer not to throw money and resources at possibilities that might not happen. But the problem is that they can happen.

With this, we conclude the Main Issues section, moving on next to look at important contributory issues worthy of consideration, before we reach the vital concluding section of Possibilities 2050, where it will all be brought together and the overall global situation will be assessed.

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Part Two
Further Issues

Urbanisation
Aid and Development
Resources and Energy
Pollution and Toxicity
Agriculture and Food
Culture and Religion
War and Peace

Urbanisation

Things that may interest you

- Cities consume 75% of global resources and produce 70% of greenhouse gas emissions.
- The population of cities worldwide grows by 1.5m people *every week*. The most urbanised continent is Latin America. One in four of the world's urban population lives in slums.
- New Yorkers use 24 times more energy than inhabitants of Kolkata in India, consuming the energy-equivalent of an oil supertanker every 1.5 days.
- Of the roughly billion poor people worldwide, three-quarters live in urban areas.

Historically, humanity passed a significant tipping point around 2008 when the number of people living in cities over half a million population topped 50% of world population – it will be around two-thirds (66%) by 2050. That's an enormous increase – the biggest migration ever. At the same time, Earth's rural population has already peaked and will decline, sinking by 600m by 2050. A majority of us is thus now shaped and psychologically conditioned by man-made environments.

The world's largest city region is Tokyo, with 37m people (same as Poland or Canada). The second, Jakarta, has 28m (same as Ghana or Australia). *City-regions* are the most important thing here, irrespective of jurisdictional and boundary issues that can make for smaller official municipalities.

The most urbanised continents are North and South America, and the least, Africa and Asia, are urbanising fastest. Globally, 28 megacities currently have populations above ten million – there will be 41 by 2030, and in 1990 there were just ten. Delhi, Seoul, Manila, Mumbai, Karachi, Shanghai, New York, Sao Paulo, Beijing and Mexico City all have more than twenty million people.

There are 43 large cities with 5-10m people, such as Singapore, Madrid and Santiago (Chile), and there will be 63 by 2030. Globally, 417 medium cities with 1-5m people will become 558 by 2030. China alone has six megacities and ten large cities. Developing countries will build the equivalent of a city of a million people every five days from now to 2050.

Most of the world's economic and population growth takes place in cities. They house most of the world's middle classes, and burgeoning middle class growth in developing economies is causing significant growth in resource-consumption, water depletion, pollution, waste output and land loss. Meanwhile in developed world cities the middle classes are challenged, even shrinking, partially as a result of computerisation and a decline in well-paid office jobs.

The total GDP output of Chinese cities outstrips or equals Western cities, but their per-capita GDP growth will take longer to grow. GDP growth in developing world cities is high due to catch-up growth, while mature, affluent world cities have lower rates of inward migration, higher growth costs and fewer investment and job-growth opportunities. So the story is quite different in cities in the developing and developed worlds.

The urban birth rate is generally lower than in country areas, but cities have a higher population growth rate due to inward migration and higher birth rates amongst new incomers. But generally, the lower birth rate is because cities' populations are largely younger, and younger people now have smaller families, or they are increasingly single or childless, while some of them support families back where they came from, thus lacking time or money to have families of their own. But the sheer numbers of people in cities make for higher overall population growth than in rural areas.

In China new research has found that, despite the migration of 200m people to cities in the last 35 years, and despite city-dwellers having three times the income of rural dwellers, rural people report significantly higher happiness and life-satisfaction levels than city-dwellers. This said, Chinese city-

dwellers generally do not report a wish to return to the countryside. This might be true globally. It suggests a preference for delayed gratification through saving and capital accumulation, of people rating wealth aspiration higher than current satisfaction, and of the attractions of modernity being valued more than traditional lifestyles and securities, especially amongst younger people.

Cities host crowds, characterised by a multiplicity of relationship networks and short-term encounters with a wide variety of people, yet they can be lonely places too. Though crowded, in cities you're on your own and the modern process of psycho-emotional individualisation operates strongly. Cities are incubators of a new kind of experience and awareness, and of separateness in a dense mass of people that we don't usually know personally or even recognise. For people from rural backgrounds, this is a profound, life-changing and also an alienating process.

Where is all this going longterm? The clue lies in the psychological, cultural and material change experienced by city-dwellers. Rural flight makes traditional farm, community and village life weaken and decline. Urbanisation is not just a matter of relocation but also of profound, irreversible social-cultural change, rather like migrating to another planet. It means the slow death of all that is traditional and rooted in the past – languages, cultures, knowledge, beliefs and lifestyles. For better or worse, humanity is becoming a very different animal living in a different universe.

As cities evolve and mature, a counter-urbanising tendency, common in Europe and America, takes root – people leaving cities for outer suburbs or the country. Mostly they do not revert to simple country lives – they take city ways, values, supermarkets, traffic, money and culture with them – not least since the internet allows townies to conduct business and gain cultural stimuli more or less anywhere, and retired and richer people have location-independent incomes too. Rural areas thus become ex-urban areas with a dispersed cosmopolitanism and economic de-concentration.

By osmosis urbanisation shifts the centre of gravity of power away from nation states toward city regions and their hinterlands. Some states will therefore weaken and others might collapse as city regions grow. Singapore, an independent city-state, has spread into Malaysia and Indonesia, creating its own centre of gravity, while Guangdong, Shenzhen and Hong Kong act as a cross-border city-region. Meanwhile, in Britain, London has evolved into a world city with closer links to faraway cities than to provinces in its own country, dominating the nation without giving it priority attention or necessarily understanding its needs. People in giant cities such as Lagos, Kinshasa, Nairobi and Cairo live in a very separate reality to most of their provincial neighbours.

People's experiences of big cities differ wildly. For some they are a place of freedom, opportunity, upward mobility and stimulus, and for others they are places of hard work, dirt, poverty, crime and insecurity. Over 70% of developing-world city growth takes place without formal planning processes and 30% of city populations live in informal settlements (slums), making inner cities vulnerable to crime, disease, flooding, pollution and other problems. Many cities have only limited capacity to control inward migration and urban growth because they cannot control the push-factors driving people their way, or even fully control their own affairs because of fragmented municipal governance, national policy overrides and lack of full jurisdiction over issues that affect them.

Governability is thus a big issue. The speed of city growth often means that urban governance is reactive, with tax-collection, investment, infrastructure and service development lagging behind growth. Some inner city areas become ungovernable, even though they are close to centres of political power. Emphasised inequality, social exclusion and poor service provision increase crime and unrest, making city government vulnerable to protest and violence – in cities it's frequently not a very long walk from favelas and slums to business and government districts, and the contrasts between these different urban environments are stark.

Developing world cities have become havens for the poorest of rural people and for refugees from climate change, conflict and land-appropriation, drawn there because of provincial insecurity and lack of rural support by central government. Resource-consumption, pollution, overcrowding, congestion, crime, social stress and lack of infrastructure pose big problems in urban areas,

especially for the underprivileged – and many issues are then exported to outlying areas through population overspill, pollution, property price growth and the many other influences cities exert.

Yet, on the upside, and for the winners, the economic, technological, cultural, architectural and social openings in cities are significant. Metropolises have become sources of progressive social change, technology, education, healthcare and governmental development, ahead of national governments and even acting as hatching grounds for rural sustainability and regeneration projects.

But in the developed world this magnetic urban pull leads to spiralling urban property prices and living costs, gentrification and deteriorating public service provision as the interests of richer people override those of ordinary people – the nurses, teachers, drivers and cleaners who service cities and keep them going. Cities can thus lose their heart and social vibrancy. In New York City, the post-2008 recovery almost entirely benefited its richest: the top 5% of households earned 88 times that of the bottom 20%, and one in five of the population still required food assistance. Meanwhile, in the developing world the big money goes into airports, motorways, business districts and shopping malls, while housing, sewage systems, health and educational provision lag behind.

So an urban crisis is looming. Cities, insulated in realities of their own, tend to counteract other, wider global priorities such as climate, pollution, bio-sustainability, food security and reducing social inequality, and they tend to determine much of what happens in rural and provincial areas. Humanity has to get wise to the enormous cultural change it has made by creating enormous urban worlds, dissociated as they are from the natural environment.

We need to cater properly for the effects that cities have on the wider environment, on their hinterlands and their own inhabitants. Many cities, as centres of economic and population growth, impact heavily on provincial areas, thereby contributing to the dominance of economic and business priorities over environmental, farming, community and natural resource concerns. In the longterm, this weakens cities' own sustainability by weakening hinterlands' conditions.

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Aid and Development

Things that may interest you

- The International Labour Organisation estimated a record 200m unemployed people globally in 2013. If you gave them their own country, it would be the fifth largest in the world.

- Trade between middle and lower income economies grew from 40% of world trade in 1995 to 56% in 2010. The developed world no longer dominates world trade in the way it once did.

- Many developing countries pay more in debt servicing to rich countries than on education, healthcare and infrastructure projects combined. Developed countries draw more money in profits from developing countries than they contribute in aid.

- Globally, 15m people per year are displaced by development projects – dams, industrial agriculture, mines, roads, airports, city growth, slum clearance and nature conservation.

Top aid recipients in 2016: Afghanistan $3.4bn, India $3.1bn, Vietnam $2.4bn, Syria $2.1bn, Ethiopia $2.0bn, Indonesia $1.9bn, Pakistan $1.8bn, Jordan $1.8bn, Kenya $1.6bn, Iraq $1.5bn.

Funds were spent on: health, education and people 19%, infrastructure 18%, general operational costs 17%, social infrastructure 15%, humanitarian aid 12%, multi-sector purposes 10%, production 6%, supporting local aid programmes 2%, and debt relief 1.2%.

Top donors: China $38bn, USA $31bn, UK $19bn, Germany $18bn, EU $14bn, Japan $10bn, France $9bn, Sweden $7bn, Netherlands $6bn, Canada $4bn, UAE $4bn, Norway $4bn and Turkey $4bn.

Top donors by percentage of GDP: Sweden 1.4%, Qatar 1.2%, Norway 1.1%, UAE $1.1%, Denmark 0.9%, Netherlands 0.8%, Switzerland 0.7%, UK 0.7%, China 0.6%, Finland 0.6%. USA is in 21st place, with 0.2%.

Per capita, in 2016 Norwegians gave $812 per year, Qataris $787, British $285, Americans $95 and Chinese $28.

Aid and development can be seen from the viewpoint of recipients on the ground, or from that of governments, agencies, NGOs and citizens in richer donor countries – and the crunch issue is matching the two. It can be seen in economic, social-cultural and environmental terms – and the crunch issue is getting all three to work in the same direction. It has three main dimensions: *humanitarian aid* (crisis relief), *development* (strengthening societies, addressing vulnerabilities and sustainability issues) and *managing wider global conditions* (food prices, inequality, economics, trade, climate, conflict-reduction and other policy issues).

Aid and development issues now involve *all* countries because climate change, crisis vulnerability and cross-border challenges such as migration, disasters, disease and environmental issues affect all of them. The world is now very much a single space and, more than ever before, nothing happens in isolation. Hazards and existential risks are rising in probability. Conditions are changing and, thanks to population growth, far more people are impacted by events. Aid, a demand-led growth industry, will continue growing. Whatever people's feelings about nationality and identity, our global situation means that nations matter less than ever, thunderclouds are equally on everyone's horizon, and no one is exempt. Sustainability is becoming a central, not a peripheral issue.

A number of key issues affect the global aid and development situation:

- *the bottom billion*, many of them living in middle-income countries such as India, most of whom are stuck in a poverty loop both psychosocial and economic, from which escape is difficult;

- *the 1-2 billion people yet to be born* in coming decades, who must be fed, housed, educated and employed, most of them in cities – if frustrated, they're liable to unrest, and understandably so;

- *capacity-building* amongst susceptible countries and populations to help them withstand economic crises, downturns, disasters, climate change and other shocks;
- *oil prices* that affect costs in agriculture, transport, production and trade, impacting most on poorer people and oil-importing countries;
- *food prices and food security* are critical – arable land is being squeezed (4ha per capita in 1960, 2ha today) and farm productivity growth is sinking (2% in the 1970s, 1% today);
- *climate and environmental change* that affect food supplies, farm and village viability, public health, local economies, ecosystem services, crises and conflicts;
- *international trade restrictions* that turn the terms of trade against poorer countries, and economic warfare (sanctions, currency manipulation, tariffs, etc) that gives short-term power advantages to strong countries, though in the longterm they undermine them;
- *weakening international agreements*, impacting mainly on smaller and poorer countries;
- *conflicts*, with multiple negative impacts on people, landscapes and countries; and,
- *transitioning* of areas from community-based subsistence economies to urbanising money economies, losing traditional support systems and gaining new pressures and challenges.

Transitioning can be socially painful, ecologically problematic and economically destabilising, leaving people bereft of the lives they once had. Much of the economic development now practiced can weaken the customary support systems that rest on personal connections and clan allegiances. These break down painfully as cash transactions, taxes, education and healthcare costs and other expenses increase. Young people leave, outsiders bid up land prices, norms and standards change, traditional markets dwindle in favour of cash-crop sales to agents and corporations, traditional healers are sidelined and local sustainability and resilience decline. This leaves people vulnerable to exploitation, land-grabs, market fluctuations, crime, social pressures and incursions.

Meanwhile, extended families and stable communities do not suit an economic system that prefers flexible, mobile, unattached labour. The weakening of social support mechanisms renders some areas into candidates for aid when previously they would have been self-sustaining. The default remedy tends to be *more*, not less, economic development, which is fine for those who thrive on it, but not for those who lack strengths and assets in a modernised context.

Much development thinking assumes that economic growth increases contentment, but this is not fully substantiated by the evidence. Dissatisfaction does correlate with low incomes, though it correlates more starkly with inequality: if some get visibly rich while others work hard to get nowhere, reported dissatisfaction increases noticeably. People in shanties and favelas generally report greater dissatisfaction than low-income country smallholders who have redeeming benefits from being on the land or from love of their home area. Some measures rate family and community relationships as a strong source of reported happiness. Prosperity helps, but not exclusively.

Modernity is a mixed bag, suiting some and not others. Aid and development patch up the rough, cruel and tragic edges of human hardship, but too many aid resources go into addressing the avoidable symptoms of injustice, conflict, inequality, bad politics, ecosystem degradation and social disharmony, with too few resources addressing their systemic and often political causes.

Economic development

Since the early 1990s income poverty has dropped by two-thirds and extreme poverty by half worldwide as a result of a rising tide of economic growth. This means a lot to many societies and it is a great and much-needed achievement. But the world's bottom billion, many of them living in places afflicted by conflict, corruption, misgovernment, drought, insecurity or difficult geography, have largely missed this development wave. They form part of an expanding global left-behind sector, a significant and growing minority in every country.

In the rich world, development is seen largely in economic terms, incorporating ever more people into the globalised market system. This expands markets, providing cheap labour and goods, yet it hastens the flight from the land, undermining cultures, informal economies and ecosystems. There's something ruthless about this, and anti-globalisation protesters rightly point out its heartless side.

Modern economic thinking divides the world into *developed* and *developing* countries. Developed countries are deemed to have a per capita income over $12,000 per year, with stable birth and death rates, low infant mortality and high life-expectancy, more women working, high resource use and high levels of debt. Developing countries have higher levels of poverty, inequality, population growth, urban and unofficial housing growth, human resource problems (nutrition, health, education and literacy), vulnerability to economic fluctuations, low political clout, poor infrastructure, higher corruption levels, lower levels of women's and minority rights and larger displaced populations.

Judgements of economic development usually take Western norms as their reference point. These link economic growth with political freedoms, democracy, property rights, rule of law, media freedom and accountability. But these values are not universally transferable and they have their hypocrisies, since Western investors and governments prop up dictators, support unjust wars and permit profitable financial, legal and military wheezes while quietly disregarding inconvenient social justice, cultural and environmental issues. However, Western-based NGOs such as Oxfam, Save the Children, Christian Aid and MSF have provided exemplary kinds of aid and development assistance. Western initiatives have mixed outcomes overall.

Some aid and investment is socially benign and well-placed; some is guilt money, compensating for post-colonial problems, military damage, dodgy politics or profits hoovered up from poor countries; and some masks corporate interests, arms sales and geostrategic aims. Large amounts of the wealth of poorer countries are lost to medical debt, resource plunder, foreign corporate interests, arms, corruption, offshore capital export and foreign debt repayment. Africa receives $134bn per year in loans, investment and aid, and $192bn leaves it annually. Such imbalances hampering developing countries' progress, quite often most benefiting their national elites and professional classes.

Inequality is not just economic – it concerns social, educational, health, psychosocial, cultural and living conditions, and non-monetary inequality is a cause of economic inequality. Within-country inequality has risen worldwide, separating those who are more from those who are less integrated into the global economy. Latin America, Africa and India are the most unequal regions. Inequality is most exaggerated in resource-rich countries where a small overclass captures most of the wealth from oil, mineral or gem extraction. Sixteen out of 47 African economies earned over 50% of their export income from one single commodity, and just 100,000 Africans hold 60% of Africa's total GDP – though while this issue is emphasised in Africa it is not unique to it.

A shift has taken place with the entry of China into the development equation. China avoids direct intervention in other nations' affairs and, since 1990, it has demonstrated that economic growth does not depend on improved political freedoms in the way that the Western formula specifies. China's aid and investment favour infrastructure-building. Its own decentralised development, bottom-up and deregulated, replicates itself in similar strategies elsewhere. China builds roads, railways, ports, industry and power networks to stimulate economic growth. Meanwhile, the West tends to support causes such as public health, education, women's rights, civil society and anti-corruption measures, which do help build foundations for economic growth but, if a rural clinic lacks reliable electricity, clean water and road connections, the benefit it brings is limited. Some recipient countries therefore try to balance or play off the West and the Chinese.

Islamic aid has grown rapidly, originating in the Gulf emirates, Turkey, the wider Muslim world and amongst Western Muslims. *Zakat*, or alms-giving, is a central tenet of Islam. Islamic aid is personalised and decentralised, focused chiefly on humanitarian aid, Middle East refugees and development in Africa, Pakistan and Afghanistan. It benefits the needy amongst the world's 1.6bn Muslims but not solely so. Islamic tradition dictates that charitable giving should be discreet, to

preserve recipients' dignity and restrain donors' pride, which grates with Western standards of financial transparency – this arouses criticism in the West but it is also less bureaucratic.

The development sector thus has its concealed agendas. Western aid is tainted with market-capture, military and political agendas, China's is one of trade dependency-building and there is some influence-peddling in some Islamic aid, a portion of it supporting terrorism and fundamentalism – though 'terrorism' is often sincere political Islamism or resistance to oppressive regimes. Thus Chinese, Western and Muslim aid all have mixed motives.

The poverty traps obstructing development are many: geography; malnourishment, poverty itself, high mortality and disease rates; unsafe water and sanitation; poor infrastructure, healthcare and education; elite wealth squandering and corruption; debt servicing (to the IMF, foreign banks and investors), conflict; discrimination, gender issues and youth marginalisation. These require fixing with social, not just economic, strategies. Prosperity eases such problems but does not really heal them, covering over but not necessarily removing the shadows of past hardships.

Something needs to shift. A root problem lies in capitalism's extractive, exploitative approach, draining countries' resources, undermining their capacity to rise out of the problems of the past and keeping them poorer and less developed than they otherwise might be. What is needed is a systemic political and economic change based on inclusion, justice and environmental and climatic priorities. This is big, urgent, fundamental and a global issue.

Social development

Strengthening society, supporting rural villages and urban neighbourhoods and improving community relations are among the priorities of social development. Incorporation into the global economy does not suit everyone and every area equally, and some people are losers within that framework. Many people are happy enough with their situation if only their needs are met, their rights and security assured, and if their lands and villages can thrive on their own terms. This is important environmentally and climatically too, for the whole world.

A critical frontline here is the relationship between modernity and indigenous first nation peoples who, though small in number, are important to the world as cultural, environmental and spiritual custodians. Frequently they are imposed upon, abused and denied their rights. Scientists hold forth on the importance of biodiversity while the global system blithely bulldozes away the world's cultural and social diversity. Indigenous peoples, languages, customs and knowledge are dying out under an onslaught of modern goods, influences and incursions, and there is a danger of modernity killing off key cultural assets that are relevant to our future.

Every human needs to improve their and their communities' lives, but this looks different to different people. A key ingredient is finding out what people themselves need and choose rather than imposing foreign models of progress. Aid agencies also need to protect people from some of the destructive effects of aid, such as emergency food imports that collapse prices, driving local farmers out of business and harming local resilience, or uncoordinated efforts by a plethora of incoming aid charities, or aid loaded with political or religious agendas, or cynical foreign media coverage that discredits aid initiatives, affecting aid donations and dehumanising aid recipients.

The UN Development Program lists its priorities to include encouraging dignity, good health, self-determination, human rights and security, access to knowledge, freedom from discrimination and a decent standard of living, as judged by people themselves at ground level. *"The human development approach shifts the development discourse from pursuing material opulence to enhancing human wellbeing, from maximising income to expanding capabilities, from optimising growth to enlarging freedoms. It focuses on the richness of human lives rather than the richness of economies..."* (UNDP). Key to this is universality – inclusive and fair application of development benefits.

Socially-beneficial development demands a multi-pronged approach, much of it steady, humdrum and undramatic – building schools and clinics, waste and sewage facilities, helping communities improve their conditions and working with social dialogue, counselling and empowerment. As world problems escalate and resources are increasingly stretched, self-help knowhow and mechanisms will become ever more crucial in helping societies square with their situation.

The people with the richest assets in this field are those from formerly crisis-ridden countries – such as Palestinians, Somalis, Guatemalans, Afghans or Vietnamese – who are strong on improvisation, attitude and experience. Notable is the Palestinian notion of *sumud* or 'hanging in there', which other long-suffering peoples know well. A hearts-and-heads approach acts as a basis by which people may get to grips with life from a stronger, more self-determining viewpoint. It utilises the assets and skills a community has within reach, encouraging environmental custodianship, sustainability, community-building, cultural and language regeneration, steered by local people.

Since 1990 aid projects have reduced child and maternal mortality, improved literacy, school completion and girls' education, drinking water supplies and sanitation. But this has been patchy: disparities remain from place to place, and benefits vary between genders, classes, ethnicities, races, age-groups, faiths and lifestyles.

Issues around aid and development

Needs are escalating and funding is problematic. Funds are pledged yet only some are delivered. Aid resources are insufficient yet needs are growing. As challenges escalate, funds will stretch thinner, especially if world economic growth slows and donors reduce aid budgets. Aid will need to become resource-lighter, oriented to self-help, empowerment, capacity-building and improvisation.

There are problems with aid financing. Donors like to control how money is spent, so local organisations have to bend over backwards to qualify for support. Many donors prefer to send in their own people rather than taking on homegrown plans and projects. Cultural differences get in the way too – in the Middle East, people trust fellow clan members to get the job done, but in the West this is seen as nepotism and corruption. Accountants, auditors and advisers required by donors consume large chunks of aid budgets. A friction thus exists between ground-level needs and the funding conditions set by donors, academic advisers or policy-makers living far away.

In disaster relief, donors prefer time-limited funding for each relief operation. But disaster damage is frequently deeper and longer-lasting, morphing from relief into development work. Donors fear aid-dependency and ever-growing funding requests. Currently they find themselves battling with aid-hostile right-wing values in their own countries too. So funding is often inadequate, projects fail to achieve their full aims, vulnerabilities remain, and not uncommonly more aid is needed later on.

A key issue is global taxation, such as a 'Tobin tax' on cross-border transactions, specifically for funding development projects and transnational UN operations. It would constrain speculative capital transfers, also stemming poorer countries' capital export by their elites and complementing the haphazard lottery and voluntary system of aid funding that exists now. But nations are reluctant to support such a tax for fear of loss of their national sovereign powers, and bigger nations in particular have an allergy to giving the UN the full range of powers it needs.

Sometimes aid interventions can be quite simple. Teaching hay-box cooking in Tanzania reduced villagers' firewood consumption, meaning that women stayed longer in their villages because wood-fetching took less time. Village life improved, children were happier, men returned from job-seeking in towns, and villages began reviving. *Educate a man and you educate a man; educate a woman and you educate a generation.* Teaching knitting to Bedouin weavers in Tunisia and Algeria meant they could sit together while knitting, since big weaving looms at home don't permit this. A women's empowerment process spread through the villages, leading to widespread benefits. Both low-budget initiatives were driven and self-funded by retired British teachers, and many thousands

were helped. Individuals and activists such as these are under-recognised: big NGOs tend to dominate the aid agenda, at times lacking simple, innovative, cheap, personal-touch creativity.

So the development business is complex, interfacing money and resources with delicate human feelings and pain. This sector is destined to grow – need will determine this. Attitudes need to shift: aid is fundamentally an *exchange*, not only a one-way flow. Rich countries are poor too, in aspects of life where poorer countries are rich. Everyone everywhere is susceptible to crisis, and all have something to teach and share. Coming times will see changes and unexpected reversals in aid.

Resilience and sustainability

A sustainable society does not use up or deplete its resources. Ecologically it is neutral-to-positive in impact. Currently, 60% of global ecosystem services are degraded or used unsustainably. To give an example, the world's use of sand for concrete far exceeds the oceans' capacity to replace it, with beach-mining causing widespread erosion and habitat loss at a time when sea-levels are rising.

Sustainability concerns social factors too. Rampant economic growth has fragmented societies. This has its dangers, especially when chronic problems such as unemployment, corruption, polarisation or disadvantage are exacerbated by the pressure of events. Socio-sustainability involves rebuilding trust, care and neighbourliness, strengthening the glue holding communities together, dealing with the causes of injustice, conflict and tragedy, also aiding the transition toward a circular economy and a reshaped, rehumanised society. Without such sustainability-building, the price will be high, avoidable and diversionary complexities will creep in and the legacy will be regrettable longterm.

Building resilience concerns improving the capacity of communities to cope with unforeseen events and bounce back afterwards. Key factors are survivability, adaptability and transformability. This is partly *psychosocial*, working with people's capacity to understand what's happening, adapt their ideas, communicate, cooperate and organise; partly *infrastructural*, to keep roads, buildings, telecoms and systems functioning under strain; and partially it's *technical*, providing access to knowhow, procedures, teams and kit for dealing with crises that come up. The danger is that profitable infrastructure construction is prioritised over social and environmental options – already a new kind of disaster capitalism has grown in places such as the Philippines and the Middle East, exploiting crisis for corporate gain and omitting to provide what ordinary people truly need.

IIASA in Austria has identified six critical changes needed to improve global resilience:

- *capacity-building*, to help improve education and healthcare, people's ability to earn income and to deal with environmental, climatic and social issues and organise their lives;
- *reducing global consumption and improving production methods*, with an accent on transport, housing, food sourcing, resource use and reducing pollution;
- *decarbonisation* of economies and development of sustainable energy systems;
- *improving nutritional food and clean water supplies* while protecting the biosphere and oceans;
- *transforming cities*, making them more liveable and efficient while reducing their environmental footprints; and,
- *science, technology and innovations* to improve sustainability, reduce consumption and enhance other factors that bolster resilience.

Each community has challenges to face, and regional and local multi-hazard risk assessments need to be carried out worldwide. The most vulnerable areas are the poorest and those where population and environmental changes are most pronounced. Regions with urbanisation and rapid growth also need to adopt equitable, efficient, green and crisis-resistant forms of development. Hospitals, schools and buildings in geologically unstable areas need to be earthquake-proof, riverine marshes need to be protected to absorb floods, infrastructure needs to handle worst-case scenarios, and early-warning, evacuation and survival systems need to be in place.

One danger is that lucrative options are prioritised. The World Bank lists five areas of development focus, including climate-smart agribusiness, green buildings, smart cities, energy storage and green investment bonds. All of these can help, but if they divert attention from or obstruct fundamental, less profitable solutions, they represent an attempt to continue the past more than to meet the future. There is an underlying assumption that the whole world can be developed to the standards of the West, but the rich world's consumption and biosphere footprints need to reduce drastically, for its own and others' good. The developing world needs to engage in forms of advancement that replace rather than replicate the kind of development by which the West has grown prosperous.

The aid and development sector is in a bind because, to gain the support of governments and powerful interests, it must avoid politics. But its work *is* political: it concerns social justice and inclusion, conflict-reduction, environmental priorities and what some on the political right would regard as anti-business, left-leaning values. Aid organisations are up against corporations, vested interests and governments that prefer to continue operating in ways that undermine sustainability, environmental repair and human welfare. Many of the UN Sustainable Development Goals are at odds with business and governmental practice. If the goals were put to a worldwide vote, there is no guarantee the public would support them – in insecure times, nationalism and short-term self-interest can thrive. The world is seriously confused in its priorities and this will hit a crunch-point.

Modernity has created critical systemic vulnerabilities, and future events are likely to drive wedges into them, forcing fundamental change. We need to re-evaluate development in the 21st Century context. This sector will evolve as time goes on through pressure of events. But the big question is whether humanity responds to its situation by holding together or by self-protection and exclusion. Populist politics and geopolitical rivalries in the 2010s do not bode well in this respect, and the security sought in such standpoints tends actually to breed insecurity.

Useful links

Human Development Report, 2016, UNDP. http://hdr.undp.org/sites/default/files/2016_human_development_report.pdf

People and the Planet, Royal Society, 2012. https://royalsociety.org/topics-policy/projects/people-planet/report/

Inclusive Growth and Development Report, WEF, 2015. http://www3.weforum.org/docs/WEF_Forum_IncGrwth.pdf

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http://interactive.unocha.org/publication/datatrends2017/resources/WHDT2017_Final_Singles.pdf

Eight Things you need to know about China's economy, WEF, 2016. https://www.weforum.org/agenda/2016/06/8-facts-about-chinas-economy/

Development Critiques and Alternatives – a feminist perspective, M Aguinaga *et al*, 2013.
https://www.tni.org/files/download/beyonddevelopment_critiques.pdf

Facts and Figures: Women's Economic Empowerment, UN Women, 2017. http://www.unwomen.org/en/what-we-do/economic-empowerment/facts-and-figures

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Resilience and Sustainable Development, Stockholm Resilience Centre, 2009.
http://www.stockholmresilience.org/download/18.53ee94ff132ea99552880003257/1459560213637/Resilience_report_for_SCSD_31march2009.pdf

Happiness and Life-Satisfaction, Our World in Data, Esteban Ortiz-Espina and Max Roser, 2017.
https://ourworldindata.org/happiness-and-life-satisfaction

Resources and Energy

Things that may interest you

- "The stone age came to an end, not for lack of stones, and the oil age will end, but not for lack of oil" – Sheikh Yamani, former Saudi oil minister and a founder of OPEC.
- The chief causes of minerals scarcity are growing demand (65%), geopolitics (54%), exhaustion of reserves (30%) and lack of substitutes – the latter mainly in high tech and chemicals.
- On average everyone on Earth uses 16kg of resources dug out of the earth *every day* - metals, minerals and fossil energy. In the developed world it is 57kg per person.
- Global fossil fuel consumption: in 2001 95,000 terawatt hours, in 2016 132,000twh, up 39%.
- Mobile phones are made from as many as 42 different minerals, including aluminium, copper, beryllium, coal, gold, iron, limestone, silica, silver, talc and wollastonite. A television uses 35 different minerals and a computer more than 30.

The problem here is not resources running out. The problem is that the cost of extracting resources is rising – financial, environmental, political and human costs. When inputs equal or exceed payoffs, the resource 'runs out' – it is not viable. It isn't gone – it's just uneconomic to extract.

This concerns EROEI – energy returned on energy invested. Getting more energy out than you put in creates economic growth, and putting in more energy than you get out leads to economic contraction. The world has profited greatly from cheap energy derived from coal and oil and from easy access to other resources, generating tremendous economic growth in the last century or two. But these times are drawing to a close. We are at *peak resources* and we have a problem.

The resources we need most to worry about are: 1. drinkable water; 2. fertile soil; 3. phosphorus (for chemical fertilisers); 4. forest; 5. accessible oil; 6. certain minerals (such as gypsum, bauxite, titanium, mica and rare earths); 7. iron; 8. natural gas; 9. helium, and 10. coal.

When a resource is exploited, the easiest deposits and means of extracting it are used first. Today exploitation requires more effort, expense, technology and environmental damage – examples being deep-sea oil drilling and fracking, which currently are only just viable. Using new technologies that allow extraction of previously inaccessible oil and gas, they are costly, sophisticated and risky. Safety, environmental and other legislation, together with risk liabilities, fines, expense and, in places, population density, make extraction operations more difficult than before.

New technologies make a big difference. New extraction and processing technologies make production cheaper or cleaner or they open up new sources. Also, new technologies replace old ones – recent advances in solar and wind power mean that they underprice oil and nuclear power, making change to renewables not only more viable but also inevitable. But even solar and wind require special metals, land-use and processes that have limits, costs and harms. Everything charges its price, but some things are better than others.

Use of limited-supply metals can to an extent be replaced by new materials such as carbon-fibre and nano-materials, but these too charge an environmental cost in manufacture and disposal. Carbon fibre comes from oil, it cannot be recycled and it doesn't rot or rust away. Metal recycling is increasingly used but, except with lead, metals deteriorate in quality when recycled, which matters a lot in some applications, so recyclability is not perpetual. Minerals such as rare earths, used in high-tech and low-carbon applications, are particularly at risk of running out.

Prices rise in response either to falling supply or to rising demand, making exploitation more profitable and thus contributing further to resource exhaustion – this destructive quirk in capitalism makes us eat up resources until they are gone. Overconsumption strips assets from the future. Two

key factors affecting resource availability are wars (such as the many oil-related wars in the Middle East) and geostrategic risks (such as closure of the Persian Gulf, Malacca Straits or Suez Canal). China has 70% of known rare earths, and other rare elements come from Argentina, Chile, Bolivia, Congo and Afghanistan – not the most stable of countries. Nations' export controls, and also geopolitical measures such as sanctions constitute another problem affecting supplies.

There is a difference between *deposits* and *reserves*. Reserves are explored, assessed and known deposits that can be exploited. Only 10% of exploration efforts lead to viable reserves. Owing to the high cost of exploration, plenty of deposits have not yet been explored or discovered. Many deposits are deep, difficult to access, poor in yield or environmentally damaging to extract. Unexploited wilderness space is itself becoming a rare resource.

Some minerals such as arsenic, selenium and lithium can be accessed only as a by-product of extracting other minerals, so their availability depends on the extraction economics of those minerals. Of concern are rare minerals such as indium (for LEDs, LCDs, computers and phones), ruthenium (photovoltaics), gallium (semiconductors, lasers and LEDs), neodymium (hybrid and jet engines), europium and yttrium (fibre optics and lighting) and rhenium (jet engines) – all important for high-tech applications. Since these metals are used in microscopic quantities they are difficult to recycle. Other minerals on the critical list are beryllium (aerospace), cobalt (jet engines and batteries), tantalum (phones, computers and car electronics), fluorspar (construction, cement, glass) and lithium (batteries and wind turbines).

Countries with the highest mineral depletion are Australia, Brazil, Chile, China and South Africa. Australia is the largest producer of bauxite, Brazil of industrial diamonds, China of tungsten, and South Africa of platinum and gold. The last major deposit of copper, vital in electronics, was discovered in Mongolia back in 2002 – copper is at risk too, and we have only 40-60 years of known reserves left. Copper is vital in electronics.

One big answer is consumption reduction – for example, redesigning phones to last 20 or more years, with repairable and upgradeable critical parts, or making better use of limited materials and allowing more efficient recycling. Items can be better made, and planned obsolescence, fast fashions and disposable gizmos must go – longterm survival is, in the end, more important than short-term corporate profit margins. Business does not agree – reuse, repair and recycling are not good for businesses' balance sheets but they're coming anyway.

What's this about peak oil and peak anything? A peak concerns the maximum output of a resource – it plateaus before gradually sinking. It does not run out, but it becomes more expensive if demand rises – and, in general, demand rises because global population, GDP and consumption are rising. Fracking and deep-sea drilling have extended oil's peak of production – it is environmental, not supply concerns, that will cause oil's decline. So 'peak milk' can mean that production output remains the same but demand rises. Demand for a resource can decline when a new technology arrives to replace it – as with fossil fuels in coming decades, being replaced with renewables. Most foods and many other resources peaked around 1990-2010. From now on, unless demand falls, their cost will rise, because their production output is in most cases not significantly increasing.

Then we come to fossil fuels. Coal is plenteous (with 188 years of reserves at current consumption rates), and oil (45 years) and gas (55 years) are sufficient but they will become uneconomic in due course. Demand for fossil fuels will sink as time goes on – this depends on policy decisions, tech developments, alternative energy sources and energy consumption rates. The world has used only about 5% of technically recoverable oil, but the price of extracting it will rise, eventually becoming unviable. Even if we stop using oil for energy, it will still be useful longterm for other applications such as plastics. While plastics bring enormous environmental problems, demand and disposal problems can be significantly reduced, though plastics are unlikely to be completely replaced.

Demand for oil will continue because replacement technologies take time to develop. Demand growth is slowing as a result of fuel efficiency, internet use (meaning less travel), slowing

population and economic growth and an overall increase in service industries (using less energy). Policy decisions and ever cheaper renewable technologies will cut demand further. By 2050, energy intensity – the amount of energy used to produce a unit rise in GDP – will be half what it was in 2013. In the energy sector, 77% of demand growth is projected to be fulfilled by renewables by 2050 but, unless there are bold policy decisions or technological breakthroughs, non-hydro renewables will still likely provide only 35% of all energy consumed globally. In 2014 it was 6%.

Global demand for coal is expected to peak around 2025 and oil around 2030. At current rates, greenhouse gas emissions will flatten and fall around 2035, leading us to an expected 3°C average temperature rise by late century, if global warming forecasts are correct. If people want better than this, they will have to pay for it in higher energy prices and by sharply reducing demand. Even if further discoveries are made in renewable energy generation and transport, the investment involved in transition is staggering, so transition is not an overnight, easy phenomenon. It is costly.

Summing up, some specific resources (such as rare earths and copper) are in short supply and they are likely to create a problem. Other resources such as clean water and viable land are a cause for great concern. Further resources will become unviable later this century. It all hangs around cutting demand, good policy decisions, technological substitutes, geopolitical solutions and new discoveries of reserves. Geopolitical issues are critical inasmuch as a political crisis or war can cause spikes in supply and prices, at times creating great difficulties. Withholding resources or flooding the market can also be used as a means of economic war.

However, this is all rather dry and theoretical. The Kogi people of northern Colombia see things differently. In their declaration to the world made around 1990, they said this. *"We are the Elder Brothers. We have not forgotten the old ways… We know how to call the rain. If it rains too hard we know how to stop it. We call the summer. We know how to bless the world and make it flourish. But now they are killing the Mother. The Younger Brother, all he thinks about is plunder. The Mother looks after him but he does not think. He is cutting into her flesh. He is cutting into her arms. He is cutting off her breasts. He takes out her heart. He is killing the heart of the world."* And perhaps they were addressing us not from the past but from the future.

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Pollution and Toxicity

Things that may interest you

- The world now has over one billion cars and vans. China alone built 20m of them in 2013.
- The top ten most polluting industries are, in order: lead-acid battery recycling, mining and ore processing, lead smelting, tanneries, small-scale gold mining, industrial dumps and scrapyards, chemical manufacture and dyeing.
- The world's most polluted cities are in Iran, India, Saudi Arabia, Nigeria, Pakistan, China and Cameroon. Many are far more polluted than Delhi and Beijing, which are famous for it.
- More than one billion people worldwide drink unsafe, contaminated drinking water, and 5,000 people die from this *every day*.
- Pollution kills at least one million seabirds and 100 million mammals every year.
- Householders use chemicals ten times more toxic per acre than farmers' chemicals.

The Tibetan high lama Karmapa XVII speaks of *non-duality*, a feedback loop binding our psyches with the world, such that they reflect and interact with each other. That's to say, we and the world around us are integral and not separate. In this way of seeing things, environmental pollution is a product of a psychological contamination causing us to pollute without thinking. A contaminated world pollutes our minds and emotions in return, obscuring our perceptions and affecting our lives. So our psychological states could be said to be intimately connected with the polluted state of the world around us. That's worth thinking about.

One problem with large-scale urbanisation is not only the pollution and waste that cities generate, but also city-dwellers' loss of natural awareness – this now affects more than 50% of the world's population, including most of its decision-makers. Noise, artificial light, electrosmog and visual pollution distort our experience of life, also acting as a contributory cause of today's global epidemic of psychological depression. *"It's a shit world"*, says a teenager I know, and she is right.

When pollution gives people concern, its personal health impacts usually worry them more than its environmental impacts, and this perception is the wrong way round. Dispersal and dilution in the natural environment has been the default solution for dealing with pollutants, on the assumption that nature will deal with it, but ambient concentrations have grown to a prohibitive level. Indoor pollution is a major component of people's personal toxic loading too.

Pollution is an outcome of our take-make-use-dispose economy, in which both natural and human capital are regarded as abundant, expendable and replaceable. Pollution impacts visibly on the world – for example, in the form of insect and bird population losses. But we fail to connect the dots and see pollution clearly for what it is, because we are accustomed to it – many people accept it as normal, even natural, that a grey pall hangs over a city, that waves on the beach are frothy and that overflying aircraft noise drowns out whatever birdsong is left.

According to *The Lancet*, pollution-related diseases were responsible for about 9m or 16% of all premature deaths in 2015, three times more than those from AIDS, TB and malaria combined, and fifteen times more than those from wars and civic violence. Nearly 92% of pollution-related deaths occur in low- and middle-income countries and, worldwide, pollution-related disease is highest among minorities, children and the marginalised. Micro-doses can sometimes be worse than larger doses, and decades of pollution exposure weaken human immune, endocrine and reproductive systems, adding up to cause multiplex diseases and susceptibilities in future generations.

More than 140,000 new chemicals and pesticides have been created since 1950. Of these, roughly 5,000 high-volume chemicals are widely dispersed in the environment. Fewer than half of these

volume chemicals have undergone testing for safety or toxicity, and rigorous pre-market evaluation has become mandatory only recently, in only a few developed countries. Past examples of materials found to be dangerous include lead, asbestos, DDT, PCBs and ozone-destroying CFCs. Lead in petrol was banned over 30 years ago but its century-long use embedded it in farmland soils, leaving longterm traces that continue to contaminate us now through our food – lead was used instead of ethanol because it made more money.

New chemicals are becoming ever more sophisticated. They include neurotoxicants, endocrine disruptors, herbicides, insecticides, fungicides, pharmaceuticals and nanomaterials – yes, you are ingesting traces of beta-blockers and statins, through your water and food (especially fish). Not only are their environmental effects markedly under-researched, but accepted safe toxicity levels are themselves questionable. Serious industry and regulatory inadequacies, biases and cover-ups are involved, and deregulation has removed controls that ought to be there.

Pollution hot-spots such as factories, mines, waste sites and sewage outlets are gradually being cleaned up, but ambient pollution from farm fields, vehicles, chimneys and rain is still increasing and under-regulated. Key drivers of ambient pollution are city growth, rising energy demand, increasing mining, smelting and deforestation, the global spread of toxic chemicals, heavy application of insecticides and herbicides and increasing transportation intensity.

In many countries, pollution regulation is carried out by a variety of ministries and agencies, and pollutants are studied in fragmented research programmes that fail to examine the whole picture or the interreactions of pollutants when mixed. They are scantily covered in medical training. Public perceptions are carefully managed by the chemical, pharmaceutical and oil industries. Regulation of pollution and its impacts is prioritised below economic growth and portrayed as anti-business and anti-progress. Not only this, but governments and regulatory authorities tend toward bias toward polluters. The rush to introduce new chemicals, technologies and products overrides precautionary restraint, and governments prefer to do little until a fuss is made.

What of the future? The *OECD Environmental Outlook 2050* mentions 'red light' issues such as greenhouse gases, alien species invasion, untreated waste water, SO_2 and NO_x emissions and exposure to hazardous chemicals, especially in developing countries, as well as increasing premature deaths from particulates and ground-level ozone. What can be done? OECD suggests making pollution in industry and agriculture more expensive than greener alternatives, through taxes and emissions trading, tightening regulations and investing in green innovation. Public education is also needed, to reduce consumer demand for polluting agents. These measures are relevant, but a deeper, more systemic change is needed: we need to reduce pollution to an absolute minimum, bringing it within the bounds of nature's limited capacity to deal with it.

Air pollution. This includes carbon monoxide (CO), sulphur dioxide (SO_2), chlorofluorocarbons (CFCs) and nitrogen oxides (NO_x) produced by industry, motors, waste burning, fires, war and other sources. Photochemical ozone and smog are created when NO_x and hydrocarbons react in sunlight. CO_2 emissions affect climate change. Particulate matter – dust, smoke and chemicals – hangs over urban areas and circulates worldwide in the jetstream, dropping on land and water, altering chemical balances in nature and affecting weather conditions over long distances.

Soil contamination derives from pesticides, fertilisers, spilled, leaked or dumped chemicals, agricultural slurry and air and rain pollution. The biggest contaminants are hydrocarbons, heavy metals, MTBE, herbicides, pesticides, plastics, chlorinated hydrocarbons and bacteria. Once this happens, soil integrity and biodiversity break down and never fully revive.

Water pollution comes from commercial and industrial discharges and spills (chemicals and heavy metals), untreated sewage (organic and chemical discharges), treated sewage (chlorine, pharmaceuticals, chemicals, detergents and microplastics), urban rainwater runoff, air deposition, agricultural contaminants (pesticides, fungicides and fertilisers), waste dumps, paint, wood preservers, suntan lotion and multiple other sources, affecting rivers, lakes, oceans

and aquifers. Organic and phosphate discharges from industrial farming and meat production cause algal blooms, ocean eutrophication and dead zones near the mouths of big rivers. Water courses and oceans have been permanently changed in chemical balance and biodiversity. Even after clean-up, mercury, arsenic, radioactive particles, phosphates, radionuclides and more are permanently deposited in riverbeds and on ocean floors.

Radioactive contamination comes from nuclear power, nuclear accidents, dumps, past weapons tests and hospitals – and it is long-lasting. Nuclear detonations in the 1950s still affect us now.

Electromagnetic radiation pervades the atmosphere: you are bathed in it. It is intense indoors and in cities, around transmitters, power lines and microwave beams and from buried power supplies. The introduction of 5G, smart meters, the internet of things and driverless vehicles will amp this up immensely. EM is transmitted through rainwater, rivers and aquifers as well as in the air and through anything metal (mattress bed springs, keys, coins, vehicle, train and aircraft bodies). Bizarrely, hospitals are among the worst EM environments. Much of the research on its effects is unreliable and dishonest, left to 'big wireless' companies with a stake in the business. Medical reporting on its health effects is scanty (brain tumours, nervous and immune system problems). Research on its effects on nature, the atmosphere and weather is thin and disregarded. When proper objective research and public awareness eventually emerge, the public response is unpredictable because the useful technologies spreading this invisible pollutant cannot easily be phased out.

Plastics range from bottles, bags, condoms and fishing nets to microplastics, clothing particles and disintegrated plastic items. Even biodegradable plastics are harmful – their constituents disintegrate but do not disappear. An estimated 8m tons of plastics enter the oceans every year, particularly from Asia. The faunal death rate from entanglement and contamination is high, and microplastics are now known to be inside fish, sea mammals and humans, suspended in aquifer water and mixed into soil and sand. Plastics float in huge quantities in ocean gyres, in the Mediterranean and China Sea, and they blow across the most remote of wildernesses. We breathe plastic particles and eat leached chemicals from food packaging on a daily basis.

Litter. Packets, cigarette butts, cans, bottles, dumped waste and metal scrap. Cigarette butts are deposited at a rate of 5.6tn per year globally. They take five years to decompose and for the carcinogens, pesticides and nicotine in them to disperse into the environment.

Tech waste (e-waste) is produced at a rate of 50m tons per year. It contains lead, barium, cadmium, dioxins, heavy metals and other ingredients, often in complex and microscopic forms that are currently unrecyclable. Your mobile phone is a box of concentrated contaminants.

Fisheries pollution, mainly from discarded fish waste and fish farms, spreads bacteria and viruses, harming living fish and birds with rotten, infected and contaminated food.

Thermal pollution comes from power plants and industry, cities and heating systems, affecting water and air temperatures, mainly in densely-populated and industrial areas.

Light pollution not only obscures the moon and stars but it affects animal behaviour and plant growth – worst in developed countries and areas with dense populations.

Noise pollution affects animal communication and plant growth. Undersea noise (ship engines, drilling, wind turbines, sonar) affects fish and cetacean communications. Ambient noise on land (industry, motor vehicles, fans, aircraft, tractors) affects human stress and health levels.

Visual pollution has a depressing and de-sensitising effect, negatively affecting social behaviour and attitudes toward the environment. It includes transmitters, advertising, unsightly surfaces and shapes, poor architecture, industrial sites, waste dumps, scarred land and obscured panoramas. Visual inputs are an important form of human and animal nourishment.

Indoor pollution includes smoke, particulates, chemicals, static electricity and electromagnetic radiation, nowadays exacerbated by heat insulation, wi-fi and electronics.

Invasive species. This happens largely in connection with trade and deliberate introduction. It includes plants, insects, animals, fungi and viruses that overcome native species by competing

for nutrients, space, light, water or food. This affects biodiversity and ecosystem adaptability. When invasive species overwhelm indigenous species, the effect is negative overall, though invaders do in some cases improve biodiversity too.

One key problem is that pollutants are treated in isolation from each other, without being treated as a mixture of complementary and inter-reacting chemicals and effects. They are assigned 'safe' levels based on short-term, narrow-scope research, but the effect of *all* pollutants, or of particular combinations, added together over many decades or generations, is both unknown and ignored. Omitting to practice the precautionary principle means that, even when specific dangers are discovered, chemicals and toxins have already been deposited in rivers and in people's livers, and it is by this time too late. Even if a person enters into a health detox regime, those toxins are then redistributed into the wider environment through excreta, only partially filtered out in sewage-cleaning processes.

In short, we're in a mess and we're poisoning ourselves and our home world. We have known this since at least the 1960s, and we have failed, individually, as nations and as a planetary race, to do much about it. The consequences in health, mental health, social distress, the natural environment, the seas and the atmosphere are vast and will reveal themselves throughout the 21st Century and beyond. Today's cocktail of well-known private and public health problems are rarely ascribed to pollution and toxicity for deeply political reasons.

We are all variously guilty of permitting and failing to question this. In some cases, deliberate deception by polluters and wilful blindness by the wider public constitute crimes against humanity yet to be identified. In future, people will wonder why this was allowed, and they will nevertheless, at the time, still pay the price for it, long after large-scale pollution has long been abandoned.

However, such abandonment is not easy, since many pollutants – plastics and EM-radiation for example – are valuable and not easily replaced, so simply banning pollutants will not help overall. Some issues can arguably be dealt with, such as the replacement of pesticides and chemical fertilisers with advanced organic growing procedures, but plastics and radio telephony are more difficult. Much of the solution lies in human usage-reduction and the exercising of due care with polluting materials. But even then, if millions of people use ecological household products, their disposal and dispersal in such scale is still problematic. We have a big problem, and we pay a price particularly for erroneous pollution-related decisions made a century and more ago.

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Air pollution https://en.wikipedia.org/wiki/Air_pollution

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Radioactivity https://en.wikipedia.org/wiki/Radioactive_contamination

Agriculture and Food

Things that may interest you

- Around 20% of world cropland is degraded by industrial-scale agricultural practices, around 75% of it moderately (an area the size of China) and 25% severely.
- On current trends, 50% of irrigated cropland will be salinated and unusable by 2050.
- Of 7,616 livestock breeds worldwide (many of them localised), 20% will go extinct by 2050, cutting future genetic diversity. One breed per month is going extinct today.
- Every week 1bn animals and 20bn fish and shellfish are killed for human consumption (FAO). Global meat consumption was 229m tonnes in 2000 and 317m tonnes in 2014, up 38%.
- If food waste and the agricultural inefficiencies of meat production were removed, and if everyone turned vegetarian, then current food output would feed the planet twice over.
- Rice, maize and wheat make up 50% of plant-based foods, out of 7,000 plants used as food.

It is commonly argued that food production must rise by 70% above current levels to feed the world in 2050. This is largely based on today's consumption patterns and on questionable assumptions related to population and GDP growth – that growth means ever-increasing consumption of meat, sugar, coffee, tobacco, chocolate and other high-end foodstuffs, each of which contribute to health issues themselves earmarked for reduction. It is assumed that health, environmental and crop-yield concerns are less important than the unrestrained freedom to eat.

But in the context of all that has been discussed in this report, will the people of 2050 have such a voracious taste for ice cream, pot noodles, burgers and steaks as people have today? Population, GDP growth and feeding the undernourished do mean there will be increased food demand, but not necessarily as much as is assumed. Lifestyle and dietary change are a key demand-side solution.

Food supply is hampered by climate change, desertification, forest and wildland loss, overfishing, soil exhaustion, species loss, soil compaction, land loss and soil degradation. We need to transition toward a sustainable future by making changes to many of our agricultural production-boosting methods – pesticide and phosphate use, crop-intensification, monoculture, irrigation and water-withdrawal, GMO production and industrial farming.

Plenty of land is available for turning into cropland when viewed from a distance but, closer up, when forest and environmental protection, location, water availability, bee and insect pollination, biodiversity, weather reliability, local conditions and real people are included, the situation is not so good. With everything factored in, even a 50% increase in food output is ambitious.

Production increases alone will not guarantee food security. Addressing inequality will help far more, since today we are faced with a shameful dichotomy of undernourishment and obesity at the same time. Worldwide, 821m people are defined as hungry, 2bn suffer micronutrient deficiencies (mainly iron, iodine, zinc, and Vitamin A) and 1.9bn are deemed overweight. 151m children under five are deemed stunted in their growth. Food insecurity is driven not only by poverty and economic slowdown but also by conflict, climate extremes and shortening growing seasons, most affecting Latin America and Africa.

Obesity grew from 23% of the world population in 1980 to 34% in 2008. This is not only a consequence of affluence: the higher cost of nutritious food and the stress of living with food insecurity are also major causes, and there could also be a link with antibiotic use and EM radiation. Countries needing to import food will have to develop greater self-sufficiency and equality of food access to survive safely in 2050.

One critical issue is meat and dairy production. It takes 25kg of cattle feed to produce 1kg of beef, and 3.3kg of chicken feed for 1kg of poultry. Conversion rates of protein inputs into outputs is 25% for eggs and only 4% for beef. Eggs and poultry are thus more efficient than beef or pork as animal protein sources. It takes 100 times the land area to produce 1kg of beef or mutton protein compared to 1kg of protein from pulses. So dietary conversion from beef to poultry and eggs, and from meat and dairy to plant sources makes an enormous difference. High animal-protein consumption will need to sink radically through dietary change to avoid food shortages.

Dietary change toward vegetarian, vegan and flexitarian diets is happening in richer countries, especially amongst younger people, and few of them would deem that they are missing much as a result. Certainly *much reduced* meat and dairy intake is needed globally. For most of history animal products have been a supplementary, not a staple food. On average, the world eats more protein than is needed, though in regions where undernourishment is common protein intake needs to rise to improve general health, though not to the high levels seen today. Two key factors determine the extent to which the world can afford continued meat consumption: 1. only about 30% of pasture can be converted to arable land, and, 2. to improve ecological and climatic conditions, at least 30-40% of pastureland (biodiversity-poor 'green desert') needs to return to forest and wildland.

Another issue is biofuel production, touted as an alternative to non-renewable fossil fuels up to the time of the food-price crisis of 2007-8. It was then realised that food production, land availability and water conservation take precedence. The explosion of cheaper renewable energy sources such as solar and wind-power since 2010 has taken the pressure off, making biofuels less promising. For Brazil, Malaysia and Indonesia, biofuel exports from sugar cane and palm oil are lucrative, and in USA 40% of the maize and 23% of the soya harvest have been converted into ethanol and biodiesel, but relatively low oil prices and fracking have undermined this growth.

In 2011 the UN Food and Agriculture Organisation (FAO) and the IMF appealed to all countries to remove biofuel subsidies and the market for biofuels has now declined. There is a case for mixing biofuels with oil-based fuels to increase burn efficiency but substantial conversion to biofuels is no longer pressing. However, biofuel-related plants do play a part in novel crop-rotation systems aimed at reducing artificial fertiliser inputs, and here a happy medium can be found.

Advocates of industrial food production conflict with agro-ecology advocates. The FAO, while arm-twisted by corporate interests, nevertheless recognises that agro-ecological methods are a priority. Governments, influenced by food-industry lobbyists, are slow to change, talking of the need to improve public health while doing the minimum to harm industry interests. The industry advocates growth of monocultural, high-input, GMO farm output. Diversified agro-ecological practices meanwhile reconcile concerns over production scales, food security, environmental protection, nutritional improvement, social equality and support for rural farming cultures.

There is room for both, but a new emphasis needs to be made to support smaller farmers, who are best geared to local markets and better overall production practices, while industrial farmers are better geared to export and large-scale production. The debate is disproportionately influenced by big food and agribusiness firms whose profit margins come first, excluding or even covering up other important issues, and whose lobbyists are persuasive and effective. But industrial farming needs an operational transformation in reducing fertiliser and pesticide use, environmental damage, land, water and ecosystem degradation, greenhouse gas emissions, biodiversity loss and choice of crops. And rural economies need to be kept alive.

Globally, around 84% of farms, or about 475m holdings, are smaller than 2ha, and they operate around 12% of all farmland. 90% of all farms, or 500m holdings, are family farms, holding 53% of farmland and producing 53% of the world's food. Meanwhile, farms over 50ha are 1% of holdings, taking up 65% of land area, most of them owned by corporations, cooperatives, religious bodies or government. Family farm ownership is lowest in Latin America and North America and highest in Asia, Africa and Europe.

A key issue is *food sovereignty* – the ability of peoples and states to determine their agricultural and food policies. This relates to corporate control of food production, processing and sales, and particularly to GMO usage, production methods, seed control and the ability of countries to feed themselves without undue reliance on international food markets. In recent decades, land has been bought and leased by some countries – the biggest being UAE, UK, China, India, Singapore, South Africa and Malaysia – from other countries – the biggest are Australia, Sudan, Philippines, Brazil, Russia and Mozambique. One-third of these deals are carried out by financial companies and sovereign wealth funds. Most of the resulting production is industrial, which tends to undermine the livelihoods of local people, interfere with their access to local resources, displace them from their homes and lands and cause environmental destruction. Consumer countries and corporations clearly wish to guarantee their food sources but the effects on producer countries are significant, especially regarding hunger and environmental issues – some call it a new colonialism. Leading countries in food sovereignty are Ecuador, Venezuela, Mali, Bolivia, Nepal, Senegal and Egypt.

Bee and insect extinction, thanks to pesticides and land use change, threatens 35% of global crops dependent on pollination. The economic value of bee and insect pollination amounts to 10% of the total value of all global food production, and robot bees won't replace them. Pests, viruses, fungi, bacteria and weeds have been adapting to chemical pest management faster than management techniques can develop – 210 species of new herbicide-resistant weeds now exist.

Since the 1960s industrial farming has produced big increases in crop yield but, over time, yields in maize, rice, wheat and soybeans have stagnated or collapsed in up to 39% of production zones. So the argument concerns corporate profits versus food system sustainability, and while the latter is important regarding environmental and social priorities, the former has more money and lobbying power, delivering food in large quantities, suitable to supermarket chains' demand needs.

One of the key drivers of the industrialisation of farming is the rising costs of farm labour and the decline of family-run farms. Many farmers are growing old, and younger, new entrants are constrained by economic issues. Modern farmers are preoccupied with engineering, marketing and business management more than with farming and land management. Loss of farm labour leads to a loss of local farming and ecosystem knowledge – longterm, this is unproductive.

Another driver of industrial farming has been the growth of exports from developing countries, involving on average about 23% of all their farm output and concentrated in some areas. But industrialisation tends to cut local food supplies by destroying local food markets, centralising food buying and driving small farmers out of business since few can meet modern commercial food standards. This means growing undernourishment in some countries as a result. Africa has changed from a net food exporter in 1970 to a net food importer today because so many small farmers have given up the farming life. The resulting urbanisation leads to major food security issues.

That industrial agriculture raised crop yields was once a given fact, but now it has come into question. Research reporting high industrial yields focuses on short term yield growth and small research samples of specific crops. When industrial and organic agriculture are compared longterm and over a wider spread of products it has been found that, while in the developed world organic yields are 8% lower, in the developing world they are 80% higher than industrial farming yields.

In the developed world farming is machine-dependent and large scale while in the developing world it is more labour intensive and eco-sensitive, better for rural jobs and supporting local rural cultures. In addition, organic crops are found to be more resistant to drought and extreme weather events – maize and soy yields in normal years are equal, but in drought years they are 30% higher on organic than on industrial farms and 13% higher than on farms using GMO cropping.

Agriculture is an area where disagreements over humanity's future can be at their sharpest. There is a big challenge to feed the world, and the conventional view is that further farm industrialisation, with ever more sophisticated precision farming, pesticide, GMO and fertiliser use, will solve the problem of food insecurity. But, to quote the International Panel of Experts on Sustainable Food

Systems (IPES), *"On the basis of the evidence gathered, there may be no greater risk than sticking with industrial agriculture and the systematic problems it generates".*

IPES concedes that tweaking industrial practices can resolve some specific problems, but it will not provide longterm solutions to the multiple problems industrial farming brings. Viewed in isolation and in the short term, industrial farming shows up well. But viewed in the longterm and in the round, reckoning in climate change, soil fertility, biodiversity, pollution, food quality and food security, as well as farm livelihoods and rural regeneration, sustainable agro-ecological practices show up significantly better.

The consumption side is important – food waste, quantities consumed, types of food eaten and public health standards are all relevant. The much-quoted need to raise food production by 70% is thus inaccurate. Food production will need to increase by at least 30% to meet population growth, ensuring food security for all. But food security is best guaranteed by tackling the problem more widely and roundly. An organisation called IAASTD reckons that, if the current food harvest were used entirely for food and as effectively as possible, it could feed 12-14 billion people. At present, with cereal production, 43% is used for food, 36% for animal feed and 21% for fuel and industrial products, and approaching half of the 43% for food goes on overconsumption and food waste.

This concerns inequality, the need for big consumers to reduce consumption and for poorer people to be guaranteed better, cheaper and more secure supplies. It concerns a dietary shift toward plant-based foods and a focus on the nutritional value of food, including micronutrients. Food futures, a form of speculation, were a cause of the 2007 food-price crisis, and speculation needs to be taken out of the equation. The food industry and its lobbying power need constraint. All-round rural regeneration, support for small farmers, farming education, sustainable efficiency, bioproductivity measures, organic and low-chemical production all need to be encouraged. Then everyone can be fed, and problems associated with urbanisation and the flight from the land can be reduced. The rural food-growing minority is a key element in the world's future.

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Culture and religion

Things that may interest you

- In 2015 31% of the world was Christian, 24% Muslim, 16% unaffiliated and secular, 15% Hindu, 7% Buddhist, 5.7% folk faiths, 0.8% minority faiths and 0.2% Jews.
- In north and central Europe, amongst 16-30 year olds, 80-90% profess no religion. In USA, 41% of the same age-group believe in a biblical God while 39% believe in another higher power.
- China has surpassed USA as the biggest exporter of cultural goods and services – heritage items, performance arts, arts & crafts, books and press, audiovisual and interactive media, design and creative services. Then come India, Turkey, Malaysia and Britain. Measured as a percentage of GDP, the world's biggest cultural producer is Britain.
- In 2014, countries where people reported the most trust in other people were the Nordics, China, New Zealand, Netherlands, Australia, Saudi Arabia, Canada, Indonesia and Kazakhstan. Least were Colombia, Brazil, Zimbabwe, Romania, Ghana, Philippines, Tanzania and Malaysia.

As Western cultural hegemony began ebbing around the Millennium, other perspectives started filling the vacuum. This showed itself with the rise of indigenous and minority movements in Latin America, Central Asia, or amongst the Kurdish, Tamil or Hausa peoples, or with countries such as Malaysia, Venezuela, Kenya or Armenia. But the main impact came from cultures hefty enough to act as viable ethical and ideological counterweights to the West.

The two main contenders were the Confucian sphere (with an enormous population and rising economic and cultural momentum) and the geopolitically sensitive Islamic sphere (with its strong ethical, political and community values). A social-political reform movement erupted in the 2010-11 Arab revolutions and, while it largely failed, it flagged up a longterm trend that is yet to flower as the Arab world shifts from the rule of oil monarchies and dictatorships toward greater social justice, social consensus and intercommunal coexistence. Which it will, sooner or later.

The American Samuel Huntington saw this rise of the Confucian and Islamic spheres as a clash of civilisations, and he was right and wrong. Indeed there has been a rebalancing, but his was the perception of an American who saw the world as a threat to American interests. The Confucian and Islamic spheres seek mainly to weaken Western influence in their patch, not to dominate the West as the West has dominated them. They seek to filter the best of the West from its more insidious and controlling aspects. A tipping point occurred with the banking crisis of 2007-8, reducing the West's cultural gravitas. Since then, the Confucian and Islamic worlds have enjoyed increasing parity in a dialogue of ideas and principles with the West.

China will be a cultural dynamo in coming decades but its dominance won't be quite the same as America's has been. Subsurface stresses between China and the Muslim world, Africa and Latin America will constrain its influence since these spheres are gaining cultural momentum in their own right, and India also competes as a major cultural exporter. We are heading toward a global cultural patchwork. But will such a patchwork have a de-globalising, insulating influence? It's possible, but unlikely. Politics and competitiveness can delay and complicate things but, as in UNESCO's observation, cultural globalisation is now *multidirectional* and *multidimensional*. That is, even when foreign cultural influences are adopted, they also change, and this increases variation.

English-speaking countries such as USA and Britain, accustomed to cultural dominance, abreact somewhat to this multidirectionality. They are less happy to be at the receiving end of the world's cultural influences and usually they don't understand others' languages. Cultural source-points are more genuinely global than before, especially with social networking and online streaming – hiphop comes in 200 languages and Bollywood and Nollywood have enormous audiences.

Survey reveal that world society seems to favour cultural diversity and localism – though the balance varies from country to country. A UNESCO survey reports that, culturally, people in most countries favour locality over nationality, and nationality over globalism. In its survey of attitudes, only Jordanians report greater allegiance to the world than to their nation. High-rating pro-global countries include Australia, Canada, France, Greece, Switzerland, Mexico, Azerbaijan, Russia, Ukraine, Brazil and Venezuela. This said, many societies are internally divided, cleaving between younger internationalists and older traditionalists, who can be more nativist.

Another survey, the World Values Survey, has found that, though globalisation would be expected to produce a convergence of world values, this is not actually so. Richer societies have in the last 30 years been changing toward greater tolerance, acceptance of foreigners, progressive and democratic values, while poorer societies' values have changed little, even becoming marginally more traditional or conservative. There is a correlation between economic security and liberalised values, and growing global economic inequality has therefore led to diverging values, globally.

Even so, there is still a problem with cultural globalisation. It permits Chinese to excel in Western classical music, Westerners to dance to African rhythms and everyone to eat everyone else's foods, but it steamrollers over smaller local cultures, languages and life-ways that are relevant to the future. Whether they die out or modernise, smaller cultures are changing and their indigenous context, relevance and significance is weakening. This is detrimental longterm, eroding global sociodiversity and bringing a loss of homegrown knowledge and variety. Once gone, a culture is irretrievable, even if it has been recorded, preserved, commoditised or anthropologised.

UNESCO lists the heritage intangibles that it seeks to preserve. These include Georgian polyphonic singing, Kyrgyz epic-telling, Indian Vedic chanting, Cambodian ballet, Sicilian puppet theatre, Belizian Garifuna, Lakalaka from Tonga, Mandinga rites from Senegal and the Gelede oral heritage of Benin. All of these are fascinating to tourists and anthropologists, but they are likely either to die, lose their reason for being, or live on only in YouTube videos and cultural festivals. Ethnodiversity, languages, histories and cultural uniquenesses are falling rapidly into history's compost pile.

A countervailing tendency enhances sociodiversity though. New cultural formats are taking shape amongst mixed-race social groups, business and academic caucuses, in cross-cultural music, amongst geeks, hippies, dissenters, activists, extremists, travellers, 67m autistics, 23m refugees, 10m stateless people and 200m migrants – some of whom preserve their traditions more avidly than people in their countries of origin. Cross-fertilisation and migration have broadened the cultural spectrum in every country. Perhaps there is a creative or diversifying tendency in humanity seeking to create variegation anew, irrespective of globalisation's standardising tendencies.

Culture is made up of a body of ideas, customs, creativity and social behaviours – it's the human software of nations and cultural worlds. Our planet is made up of a variety of such worlds, each with unique reality-structures formed over millennia. This variety is changing: following a few centuries of Euro-American influence, around 1990 we crossed a critical threshold, stimulated by travel, computerisation, financial deregulation and the end of the Cold War. The American thinker Francis Fukuyama called this 'the end of history' but really another story was starting. The world's social-cultural blocs are rearranging themselves.

Since 1990 the world has become materially more uniform – we all drive roughly the same cars, use the same phones and our homes are stacked with items made in China. Yet cultural contrasts are growing more emphatic since all cultures are obliged to square with each other anew in the expanded ethno-cultural ecosystem of modern times. They see a new perspective of themselves, and deep creative dynamics are afoot. Multiple outcomes are bubbling up, previously unforeseen.

Taking gender politics as an example, while this historic shift started in the 20th Century West, it arises independently through the perceptions and choices of women within their own cultures, for their own reasons and in their own ways. It's an idea whose time has come. In the West, Muslim

headscarves are seen as a symptom of a male dominance, yet to many young Muslim women headscarves are a feminist statement. Western women's preferences are not universally applicable.

These deep creative dynamics are also generational: the Millennials are history's first truly global generation – though their foreparents laid the ground. Millennials' worldviews are closer to those of fellow Millennials worldwide than to those of earlier generations in their own nations.

So we are now in a period of cultural fermentation, leading toward a time and an outcome we do not yet see. We have stumbled into a social-cultural mêlée, an encounter of multiple, shifting identities and expressions. We are faced with a challenge to work out our distinctions at a time when global cohesion has never been more necessary. To achieve such cohesion, we must sort out our differences. Diversity and cohesion are both important, and the world will oscillate between them over time. While they are globally very interdependent, nations, ethnicities and groups are finding a new sense of identity, creativity and viewpoint unique to themselves.

Identity is also framed in relation to specific contexts – people respond differently to 'immigrants' than they do to foreign doctors or performers. All societies are internally divided, maintaining a collective equilibrium that survives as long as potent issues stay below the surface. But erupting frictions are necessary because each culture has historic ghosts and ghouls to exorcise. Success in dealing with frictions depends greatly on public maturity and helpful social leadership. This will be a crucial and sometimes painful truth-and-reconciliation process on a global scale.

Part of Russian society is European and part Asiatic in orientation; part of British society is insular and part internationalist; part of Indian society is urban and cosmopolitan while part is rural and poor. These contradictions mooch along well enough until something triggers a heated reaction. News coverage and online social networking make these reactions snowball or spread globally, and damage can be done very quickly. Such eruptions can also be helpful: an online campaign to support the rights of an ethnic group or a cause, or railing against corporate interests, unconceals malignant local or national issues. So global influences can support localism in some contexts.

Globalisation has charged a price in terms of languages, knowhow and traditions lost, suffocating customs and sociodiversity. The world will regret this. Tradition is easily eroded by education, emigration, intolerance, violation of traditional rights, insensitivity, bad policy, museification, ever-extending roads, phone networks, tourist and media penetration, replacement of hand-crafted items with manufactures, and infiltration by the money economy. But cultures are not static and, if they become so, they dwindle and lose relevance – even indigenous people leave them behind.

Religion

Until the 1990s the expectation amongst seculars was that economic growth and modernity would reduce religious affiliation, belief and 'superstitions', but this has proven untrue. Religion has grown as a medium of faith and cultural identity. Partly this has been a reaction against modern secular materialism, amorality and double standards. Of the main cultural contenders, the Islamic and Confucian spheres, the first is religiously based while the other hosts far more religiously unaffiliated people than Europe, the historic source of modern secularism.

Statistics can be compiled of the numbers of people affiliated with traditional faiths, but three key factors are often missed. First is the genuine depth of people's faith and the extent to which it is heartfelt and truly *lived*. The second is 'default believers', who state an affiliation while not really practising it – they might be disaffected, lapsed or uninterested. Nonetheless they swell adherents' official numbers. The number of default believers is probably high and rising but counting them is difficult. The third factor is unaffiliated people, some being secular and some with an independent spiritual orientation – perhaps yoga, meditation, or spiritualist, folk, pagan, new age or personal beliefs – but researchers tend not to distinguish these two groupings. People on an independent path represent an unmentioned elephant in the room both for seculars and religionists. These three factors make figures unreliable and solely indicative.

Many people affiliate with the religion of their birth to avoid stepping out of line. In the Middle East, secular Arab socialism was strong in the 1950s-70s but, as Islamic fundamentalism gained ground in the 1980s-90s, many people re-affiliated with Islam for identity reasons, or due to community pressures, obligation or safety fears. Today, 20-30% of Arabs and Iranians are secular or spiritually independent but they keep quiet. Similarly, many Europeans say they're Christian, remembering their faith only at Christmas, Easter and funerals.

Unaffiliated people have not significantly increased in number except in Europe and amongst younger generations in North America. They represent 16% of the world population, or 1.2bn people, chiefly in the Asia-Pacific region and Europe, and they are expected to grow by only 3% by 2050, compared with 70% growth for Muslims and 34% for Christians. As a share of the world's population, unaffiliated people will decline mainly because they are older, with lower birth rates than Muslims or African Christians. In Europe, Muslims are predicted make up 10% of the population in 2050. The largest Muslim country in the world will be India, though it will still be mainly Hindu. In USA, Christians are expected to decline from 75% to 65%, mainly by switching or lapsing, and there will be more Muslims than Jews. 40% of all Christians will live in Africa, and Rome, Canterbury and Texas will be far from Christians' centre of gravity by then.

Religious switching is not widespread, with movement mainly toward Islam or non-affiliation, away from Christianity, while other faiths hold steady. Globally, by 2050 40m will adopt Christianity but 106m will leave it. There has been significant religious adoption in Russia (Orthodox Christian), China (Buddhist and Evangelical) and across Africa (Christian and Muslim).

The main future trends arise from birth and death rates: Muslims are on average younger, with higher birth rates, while Christians (except in Africa), Buddhists, Jews, other faiths and the unaffiliated are older, with lower birth rates. Christianity is the largest faith by population but, by 2060, Islam is expected to equal it, at around 3bn each. Islam, currently with around 1.6bn adherents, is growing rapidly due to higher birth rates, more new adopters and lower rejection rates amongst Muslim young people.

Hindus will increase from 1bn to 1.4bn. Buddhists, numbering 488m, will decrease slightly by 1.5m – living in low-birthrate countries such as China, Japan, Korea and Thailand. People observing folk faiths will grow by 11% to 450m. Other faiths – Sikhs, Baha'is, Jains, Taoists and others – will rise 6% to around 61m. Jews will grow slightly from 14m to 16m.

Interfaith conflict is less common than conflict *within* faiths. Muslim terrorism has killed more Muslims than Christians or seculars. Friction between Sunni and Shi'a Muslims is greater than it has been for centuries, much because it is politically exploited. Christian monks and priests fight each other in the Church of the Nativity in Bethlehem and at the Holy Sepulchre in Jerusalem. There has however been a surprising rise of frictions by Buddhists against Muslims in Sri Lanka and Myanmar and against Christians in Bhutan. Western military interventions in Iraq, Palestine and Afghanistan have been seen by many Muslims as a new Crusade – with some justification because the West's chief sabre-rattlers have been right-wing American Christians.

Islamic fundamentalism is slowly subsiding. However, influenced by Muslims in the West, a new real-life Islamic consciousness is developing, especially amongst the young. This will continue thanks to generational change and a likely incremental decoupling of religion from politics in the Muslim world. Fundamentalism was a reactive response to Westernism but, as Western influences deflate, fundamentalism too could lose traction. Islam is generally more stretchy, consensual and multicultural, with less emphasis on institutions and priesthoods than Christianity and with an emphasis on the individual's personal relationship with Allah. It is a behavioural, legal and social system, a complete package, and its numerical gains, especially amongst the young, suggest that they see it to be relevant to their experience of modern times.

The Confucian world has its philosophical and behavioural norms but, just as Hindu culture is best defined as 'what Hindus do', Confucian culture is 'what East Asians do'. China and East Asia, with

their ancient roots, went through a painful 20th Century, rebirthing since the 1980s and thus quite well adapted to meeting the 21st Century. Such a cultural regeneration is starting in the Muslim world, while the West, its spiritual regeneration window having been in the 1960s-70s, has to some extent missed its chance, except in the case of independent spiritual people with limited impact on prevailing Western culture. Africa's cultural regeneration is germinating, with Christianity vibrant and folk faiths thriving too. Latin America, promising in the late 20th Century with its liberation theology, has reached a deadlock between its radical and conservative elements.

Religion is here to stay and is finding new life in the modern context. As cultural reactivity to Western dominance subsides, with the world morphing into more of a cultural patchwork, the big question is how much religion and culture will be sources of either friction or reconciliation. This question orbits around internal rumblings between progressives and conservatives within all religions and cultures. Progressive elements tend toward interfaith and cross-cultural reconciliation, while conservative elements tend toward greater cultural anxiety and defensiveness.

Quietly in the background, independent spiritual beliefs wax ever stronger, partially because of education and travel, partially because of an increasing women's autonomy of viewpoint, and partially because many modern, thoughtful people are forming their own conclusions on spiritual matters. Even secular rationalists, those self-appointed guardians of empirical, untainted objectivity, have their high priests, doctrines, saints, articles of faith and hypocrisies.

The core of the shift the world needs to go through in coming times is *spiritual*. Traditional faiths play a role inasmuch as they encourage spiritual experience, and a sense of the greatness of the grand scheme of things in which we are but small particles. Yet their traditional trappings can also obstruct such an opening to deeper understanding. The late Sheikh Bukhari of Jerusalem once said, *"God is too great to fit inside one faith"*.

A key lies neither in specific beliefs nor in scriptural or spiritual adherence but in our actions toward each other. '*By their works shall ye know them*', said Jesus – and each faith has an equivalent gem of such wisdom. One does not need to be religious to recognise the spirit in every human and the essential kindness, respect, equality and justice that derive naturally therefrom. Spiritual experience has a clarifying, simplifying effect, helping us put things into proportion, seeing beyond the situational details of our lives to perceive our deeper priorities. We are one humanity living in one world. We need to act on that basis. A PhD is not required to perceive this essential truth.

Interesting links

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War and Peace

There is no peace without development, no development without peace, and neither peace nor development without human rights – Kofi Annan, former UN Secretary General.

- A civil war costs a medium-sized developing country (such as Ethiopia) the equivalent of 30 years of GDP growth, and it takes 20 years for business to return to pre-war levels.
- Interpersonal violence kills 1,300 people daily – nine times the number of lives lost in war.
- In 2016 conflict cost the world $14.3tn or 12.6% of global GDP (UN OCHA).
- World military spending in 2011, at $1.7 trillion: USA 40%, China 8%, Russia 4%, UK 3.6%, France 3.6%, Japan 3.4%, India 2.8%, Saudi Arabia 2.8%, Germany 2.7%, Brazil 2%, Italy 2%.
- Of 25 major conflicts in 2017, 10 worsened, 15 were unchanged and none improved.
- In 2016, only Botswana, Chile, Costa Rica, Japan, Mauritius, Panama, Qatar, Switzerland, Uruguay and Vietnam were uninvolved in conflict.

War does not directly touch the majority of the world's population, but indirectly its shadow falls on everyone, everywhere. It represents a serious failure of international relations and accountability. But violence affects many more of us in our streets and homes. Three key issues are important to examine: the direct effects of conflict and violence on people, communities and landscapes; longterm, trans-generational damage; and indirect effects on the wider world.

According to UN OCHA, of the $14.3 trillion spent on and lost in conflict and violence in 2016, $5.6tn went on military spending, $1.0tn on conflict losses, $4.9tn on domestic security spending and $2.6tn in losses from crime and interpersonal violence. This represents 12.6% of world GDP or nearly $2,000 per person. In the thirty years to 2015 military spending grew by 25% in developed countries and 240% in developing countries – and developed countries profited most from it.

War-displaced people in 2016 numbered 65.6 million, of whom 40.3m were internally displaced (IDPs), 22.5m were refugees and 2.8m were asylum seekers, putting big pressures on recipient areas and countries and affecting their own economies, societies and politics. Refugees came mainly from Syria 5.5m, Afghanistan 2.5m, South Sudan 1.4m, Somalia 1m and Sudan 650,000. In 2017 the five most militarised countries were Israel, Russia, North Korea, Syria and USA, and the least safe countries were Iraq, Syria, South Sudan, Afghanistan and Yemen.

The damage and hurt to people, infrastructure, landscapes, communities and nations is crazily big. Even so, war deaths have declined, in terms of absolute numbers and also as a proportion of the growing world population. Three wars, in Afghanistan, Syria and Iraq, accounted for 75% of all conflict deaths in the twenty years up to 2016. Major wars, especially those between states, have also declined, concentrating in the Middle East and central Africa – Congo, the Central African Republic, NE Nigeria, South Sudan and Sudan.

Globally significant conflicts, escalating after 2010, climbed to fifty in 2015, the most since 1992. Eleven were major and 39 were smaller. The major wars were in Yemen, Iraq, Afghanistan, NE Nigeria, Somalia, Pakistan, Ukraine, South Sudan, Palestine and Syria (two wars, involving the Assad regime and ISIS). The increase was caused mainly by social, environmental and climatic change, plenteous weapons availability, foreign money and interference, proxy-warring, oil and minerals, government weakness and (except in South Sudan, Ukraine and Palestine) Islamist extremism. Conflict deaths peaked in 2014 (104,000) and 2015 (97,000), a post-Cold War high. These eleven wars accounted for 92% of battle deaths. Battle deaths are not the whole story, since disruption, displacement, hunger and breakdown cause further death, injury, harm and trauma.

Between 2000 and 2014, the main conflict drivers at local level were identified as: regional differences 26, violent ideologies 22, land capture or protection 21, competition for power and disputed elections 20, interethnic stresses 20, conflict spillover from elsewhere 19, resources and minerals 11, population movement and migration 7, and drugs or arms trafficking 6. Key external drivers were foreign military intervention, border-crossing armed groups and refugees, IMF structural adjustment requirements imposed on fragile states, trade in arms, drugs and minerals, the 2008 financial crisis, and the effects of climate change.

War is often used by leaderships and conservative elements to block or divert social change. WW1, the 'war to end all wars', was an attempt by a dying order of monarchs and aristocrats to retain power at a time when a new order was emerging – the new order won, but at great human expense. Recent conflicts in Syria, Libya and Yemen demonstrate a similar resistance to social change.

When social dialogue polarises, perceptions cleave and splinter, tolerance and trust disintegrate and neutrals are obliged to take sides whether or not they wish to. In places where there have been tolerance, coexistence and intermarriage, this can be devastating. The dehumanising mentality of conflict kicks in and social consensus is hijacked. Avoiding polarisation during times of change is a critical issue in coming decades – social polarisation in the 2010s have served as a warning. Countries and interests that think in terms of antipathy and threat are more prone to warfare.

The capacity of the international community to contain and avoid conflict is limited – conventions are signed on weaponry, humanitarian issues and the laws of war but compliance, especially by major powers, authoritarian states and non-state actors, is weak. The UN Security Council is dominated by five permanent members (P5) who, between them, happen to be responsible for 70% of global arms production, and the General Assembly and other bodies possess inadequate powers to override the P5. The UN's powers to overrule the sovereign right of nations to wage war are very limited – mainly taking the form of moral sway, advocacy of restraint and the hosting of peace conferences. Its capacity to regulate the arms industry and private military contractors is constrained, largely by those nations who benefit from arms sales or armed superiority. Conflict has become re-normalised after a brief interlude when a 'peace dividend' was hoped for around 1990.

High military expenditure and plenteous weapons availability invite their deployment. Global arms sales are worth over $100bn annually. Even losing a war or creating mayhem can be profitable, as are postwar rearmament and reconstruction. Some conflicts, such as the 1990 'Desert Storm' Gulf War or the 2014 Israeli 'Protective Edge' war on Gaza have been construed by some as promotional military hardware exhibitions – sales of new weapons rose straight afterwards. In Palestine a bitter joke goes that buildings are built with Euros and destroyed with Dollars.

Diplomacy and conflict de-escalation are unprofitable to the military-industrial sector, which thrives on 'military Keynesianism' – government investment in arms to pump up economies – and on lucrative demand from billionaires and syndicates, contractors, militias and warlords. Richer countries have outsourced warfare to arenas such as Syria or Yemen, which serve as chessboards for international power manoeuvring and proxy wars. The scale of today's arms industry will probably mystify people of the future, who might also legitimately wonder why humanity failed to appreciate how much war endangered the world, holding back progress toward better things.

Longterm damage

Psychosocial damage from past conflicts (also from repressive regimes) is significant, passing down through the generations. Such deep pain can subside with time, but proactive social healing more properly consigns it to the past – nevertheless, it leaves traces. Commonly, wars occur in places where there have been conflicts before. In Palestine there is a 12-15 year *intifada* (uprising) cycle: when violated toddlers in one *intifada* grow to teenage years, hoping for a better future and not getting it, the cycle repeats. Meanwhile, Israelis, trans-generationally traumatised by the Holocaust,

live in the world's most militarised society, renowned for its fast and furious military responses to threat – though this is wearing thin with Israeli Millennials, for whom the Holocaust is history.

Psychosocial conflict damage is global, and healing it is one of the 21st Century's big projects. Some societies have resorted to *affluenza* – materialism and consumerism – to compensate for past pain, but this acts more like a painkiller than a medicine and itself can cause war, and it has led to a global crisis of unsustainable overconsumption. Affluenza pushes away uncomfortable truths until another day, suppressing social healing. Economic downturn can then lead to old shadows re-emerging, as has been the case with recently resurgent nationalist and neo-nazi movements.

The tendency to replicate conflict is common – in history, rampant imperialists such as the Romans, Mongols, Ottomans and British were all themselves invaded first. Violence, an infectious virus, is difficult to shake off. But replication is not inevitable. Japan and Germany have studiously avoided conflict since 1945. India and Pakistan, both damaged after their separation and independence in 1948, have pulled back from the brink several times – though each nonetheless carries a heavy military burden. China, with a century of hardships behind it, and with the world's largest army, mostly avoids military force, resorting to commercial soft power to further its interests – though domestic suppression of Uighurs, Tibetans and dissenters has been a very different story.

Trauma recovery is a key ingredient in peacebuilding and social development. To quote Palestinian educationalist Hussein Issa, *"Every act of violence begins with an unhealed wound"*. Trauma affects economic development, political and social cohesion, public health, mental health and environmental depletion, and its effects and repercussions are global.

The economic costs of conflict are staggering. In Syria, where 400,000 people have died and 5m refugees have left the country, GDP loss between 2011 and 2016 was $226bn, four times Syria's pre-war GDP. This does not include loss of trade, migrant costs, military expenditure and costs incurred by other countries, or future reconstruction and rehabilitation costs in Syria, or GDP loss over the decades after the Syrian wars end. These burdens do not disappear when a war ends – they continue for decades, long after the media and world attention have moved on to other things.

Globally in 2017, $12bn was spent on hosting refugees, $12bn on peacekeeping missions, and 141m people in 37 countries needed war-related humanitarian assistance. Conflict prevention could save between $5bn and $70bn per year (low and high estimates). Put another way, perhaps $300-500bn could otherwise be spent in a decade on development, healthcare and education in needy countries. Peace-related investment is durable while conflict investment mostly goes up in smoke.

Wider impacts

The psychosocial consequences of conflict, including to societies not involved, has a seriously disheartening influence on the world, making us feel bad, losing faith and trust in fellow humans. Media obsession with conflict brings war right into our homes. Violation, destruction, conflict pollution and other effects, as well as sheer expense in taxation, loss of trade, supply-line disruption, migration and threat-contaminated geopolitics all maintain a fractious, insensitive and brutal mindset infecting the world. Conflict taints social and international relations, fostering a culture of indifference and compassion fatigue – wars arise because we *permit* them, if only by omission and commission. Society tends to accept conflict as a perennial fact of life.

Social violence is an integral part of the endemic culture of conflict. According to WHO, half a million people are killed by interpersonal violence every year worldwide (80% of them males), while 23% of adults report physical abuse as children, and 30% of women have experienced physical or sexual violence by a partner. Interpersonal violence and wider conflict are interrelated, particularly when civil institutions are weak and society becomes accustomed to or accepting of violence, even if grudgingly. Interpersonal violence is generally decreasing but it remains high in regions such as Central America, Brazil, Colombia, USA, Congo and South Africa.

Meanwhile, 70-90% of current war casualties are civilians. The majority are women and children, compared to a century ago when 90% of those losing their lives were uniformed military personnel. The boundary separating combatants and non-combatants is nowadays blurred: are angry teenagers, sympathisers or families sheltering combatant sons themselves combatants?

Then there is civil war. It is often understood that civil war is sparked by grievances such as inequality, political repression or ethnic and religious divisions, but research shows that this is not necessarily so. Economic indicators such as dependence on commodity exports, low incomes, slow economic growth, corruption and large diasporas are all significant predictors of civil war, but these don't necessarily spark war unless whipped up as grievances by ideologues and political leaders, who take advantage of public frustrations to gain or retain power and wealth. Many wars are critically dependent on natural resource predation and political manipulation.

Leaderships motivate their followers to hate the enemy, building longterm ill-will that leaves its mark after they are gone, and this can create future conflict potential. Peacebuilding in civil wars therefore involves addressing the wider preconditions of conflict. This is difficult because non-intervention in the sovereignty of nation states is customarily never overridden in the cause of peace even though it is frequently overridden in conflict.

The world wastes vast amounts on war. This irrational, perverse luxury we can no longer afford – and most people are losers. Ending war is not simply a matter of moral choice: in the context of the range of escalating world issues covered in this report, conflict is a very real diversion from our main global priorities, an avoidable expense and a self-harming pattern we need not have.

Technological warfare

Throughout history, military research has been at the cutting edge of technological research and development (computers, for example). Voters in democracies do not like sending their sons to war, so richer countries have resorted to high-tech weaponry as a supposedly clean and precision-targeted means of achieving war aims – except that the remoteness of warplane or drone pilots means that plenty of wedding parties, doctors, children and bystanders get hit too, driving local populations against such interventionists as NATO. More innovations are coming, including directed-energy, electromagnetic, sonic, laser and particle-beam weapons, robots, swarm robots and unmanned autonomous weapons. Nuclear weapons are being upgraded and bio-warfare is possible.

Nuclear capability has been developed since the 1940s by USA, USSR/Russia, UK, France, China, Israel, India, South Africa, Pakistan and North Korea. The world is currently the proud possessor of around 15,000 nukes, of which roughly 1,800 are primed for immediate use, 90% of them controlled by USA and Russia – though these two powers are slowly reducing nuke numbers, partially because new nukes and delivery systems are being developed. Nuclear arms are regarded by possessor countries as a sign of status and deterrence, though few non-nuke countries concur – and they are unlikely to be attacked unless by accident or madness.

The utility of nuclear weapons is limited – a first-strike nation is itself likely to be struck in return, thus leading to no-win outcomes. Smaller nuclear weapons for tactical, precision strikes might be cleaner and less devastating yet they nevertheless invite escalation – as well as throwing up so much dust and fallout that the world's climate could be affected. Total nuclear war means the end for most people except perhaps those in isolated areas whose life-possibilities would still be harmed. Nuclear disarmament should have been resolved in the 1980s but military lobbies in all nuclear states except South Africa opposed this on the basis that possession of nuclear arms deters other nuclear powers from offensive action. So despite the risks, the world is stuck in a loop, seemingly incapable of disarming even after 70 years of anti-nuclear protest.

Autonomous weapons. While remote-controlled air, undersea and land drones already exist, AI-directed autonomous weapons are yet to be developed. They will be able to navigate and fire without human involvement. Target recognition and proportionate use of force are critical issues –

how to distinguish a tank from an ambulance or a fighter from a civilian – and some doubt that sufficient accuracy of identification is possible. Machine learning – AI's capacity to learn from experience – also poses risks since it can form conclusions that humans cannot easily disentangle or override. There is also a legal problem since, in the laws of war, responsibility must be attributable to someone. If no human is involved in firing decisions, only programmers, manufacturers and owners of the weapon can be held accountable, and this is legally complex.

Removing soldiers from the frontline makes war easier to wage. So autonomous weapons could reinforce public indifference to war – in the eyes of distant viewers, it would make conflict look more like a computer game. Autonomous weapons cut human losses for the side possessing them, but capital costs paid by taxpayers, collateral damage sustained by victims and corporate profits could rise. They can be hacked, and penetrating their 'brains' will become critical in battles where such weapons fight each other. They could be used by non-state actors, terrorists, or by oppressive regimes for crowd control. They represent a step-change in warfare and pressure is rising to ban them. However, inter-state competition to develop them first, and the potential advantage and profit involved, imply that such a ban might be unenforceable, already too late.

Bio-weapons can be made relatively easily and cheaply by a biochemist using synthetic viruses and toxins, but their control and delivery presents difficulties, since they are affected by wind and war-chaos. They are easier to develop and implement than nuclear weapons yet their potential for mass horror and destruction is similar. They can infect target populations, spreading pathogens against which there might be no cure – cut-price mass-destruction. The 2013 Syrian breach of international laws over chemical weapons bodes badly for the future control of bio-weapons, which go far further in effect than chemical weapons since, once victims are infected, especially with pathogens with slow incubation periods, they become walking time-bombs.

Cyber-war can be waged in various ways – espionage, surveillance, sabotage, propaganda and disruption. Leaders in this field are USA, China, Russia, Israel, UK, Iran and North Korea, plus non-state actors such as ISIS and some hacker groups. In cyber-war attribution is difficult, and operators can use clever ambiguities as a cloak. It can penetrate a nation or organisation at its core, affecting its most strategic assets and control systems.

Espionage and surveillance usually penetrate strategic computers and networks – targets such as intel and military agencies, banks, corporations or government departments – but they now also exploit public platforms such as Facebook or Google, scraping data from everyday web-traffic which, when analysed, provides an understanding of the inner workings and details of a nation, zooming in on specific indicators or data-streams to gather intelligence or spread ideas. *Propaganda and political influencing* through major internet platforms has been shown to influence public opinion through fake news, disinformation and targeted messaging, using bots programmed to appear quite convincingly like humans. This is politically and strategically complex.

In the case of *sabotage*, malware can be inserted into crucial computers for activation at a chosen time or circumstance, potentially disrupting key systems such as power supplies, hospitals, tech companies, banks or government departments. Denial-of-service attacks render key online services unavailable by overloading them with incoming data. Internet services can also be sabotaged with power outages or even simply cutting undersea internet cables. In the case of *disruption*, malware can disable or hijack systems, and ransomware can raise large sums of money by hijacking websites, services and databases until a ransom is paid or other conditions are met.

Cyber-warfare is cheap and easy compared to armed forces or nuclear arms. It requires a few tens or hundreds of programmers using relatively inexpensive equipment, and its stealthing capacity is considerable. Defence against cyber-war is far more complex and expensive than attack, and the introduction of IOT (the internet of things) makes for serious vulnerabilities since IOT technologies can be hijacked by malware, then to act as proxies to stage simultaneous multi-source attacks, with

the possibility of taking over planes, crashing driverless vehicles, cutting power supplies or interfering in other system-critical processes.

Cyber and economic warfare could sideline military warfare. Nuclear arms, navies, air power and military offensives are expensive and complex, while cyber-war has suddenly made offensive actions cheaper and more efficient. Offensive use of artificial intelligence constitutes a risk yet to come – theoretically, a war could be carried out in three minutes without anyone knowing until its consequences are felt. Using AI as a weapon is an enormous risk yet to come.

Economic and financial war

Economic war, involving sanctions, embargoes, blockades, manipulation of resource prices and markets, is a blunt instrument, repeatedly harming wider populations more than the oligarchies they target, and not always resulting in the sought-after outcome. However, it does create effects: economies and currencies can be sabotaged, market crises can be sparked, false economic information can be circulated and key national assets and government treasuries can be hobbled.

Financial war focuses on banks and computer networks, on the principle that if specific targets are blocked electronically or by political pressure – such as USA disallowing a bank or company from trading in USA, or threatening sanctions on banks or companies that trade with them – then money simply stops flowing. This can be targeted accurately and strategically. Money can be confiscated or frozen, oligarchs and companies can be hit and regimes' leaders can be targeted. This kind of conflict is frequently inter-oligarchic – but then, many military wars are so too.

One consequence of America's various sanctions imposed on Russia and Iran is that, while causing short-term pain, loss of trade, shortages and other pressures, in the longterm it can weaken USA itself. Sanctions have encouraged China, Iran, Russia and other countries to build an alternative cross-border financial system ready to bypass US dollar predominance in international payments and trade. Use of dollars as a global reserve currency has enabled USA to grow its debt to such an extent that, if dollar payments were switched to currencies such as the yuan or the euro, US treasury debt could become unserviceable. The Shanghai Cooperation Council is thus accruing an option to drive USA toward sovereign bankruptcy – the global effects could be catastrophic. So US sanctions do not lack longterm consequence. Dollar predominance will end sometime for many other reasons, but a sudden market switch could hobble USA, creating a major crisis. This is potential economic sabotage on a huge scale.

Other countries can do it too if they have valuable assets available. In 2014 Saudi Arabia decided to pump extra oil to create a glut, collapsing oil prices. Consumer countries were happy and producer countries were sabotaged. This move undermined the expanding US fracking industry, it hit Iran, Russia and Venezuela, slowed global conversion to renewables and strengthened Saudi Arabia's geopolitical position, affecting the whole world through oil price mechanisms.

Economic war has some similarities to nuclear war: there can be tremendous blowback and the overall effect can be devastating. Saudi Arabia's oil price-fixing measures drained its wealth while creating further unwanted consequences. So economic war is a bet with mixed reverberations yet, as with military battles, once the first shot is fired, the world's greatest army cannot guarantee the outcome (as USA demonstrated in Vietnam, Iraq and Afghanistan). World wars are no longer useful: a country or alliance can be felled by far more energy-efficient means, and remotely. This might have some virtues: the Cold War ended partially because both sides war-gamed many nuclear scenarios, only to find that neither would win – and this helped end the Cold War. But economic war is not a game, and it affects the lives of people in millions and billions.

Financial and economic war have a future, though they are risky, threatening the world with unforeseeable repercussions. It puts power in the hands of oligarchs, financial institutions and techies, drawing in the private sector and rendering ordinary citizens into unwitting war victims. Cut off supplies of specific components, resources or financial access and you can ruin a nation or a

key sector. This capacity for bloodless war makes it politically attractive to potential winners but its wider, longterm consequences could cripple the world economy, hitting the poorest hardest. And there is a bounce-back. Increasingly, in all areas of conflict, overriding global interests and priorities will charge an ever-rising toll on the initial attacker.

Peacebuilding

Peacemaking involves calming a conflict and doing whatever is necessary to stop it reigniting – this can involve armed, police and humanitarian intervention. *Conflict resolution* involves negotiation, mediation, arbitration and diplomacy to deal with the dispute and forge agreement and a cessation of fighting. *Peacebuilding* invigorates mitigating factors and addresses the longer-term underlying issues driving conflict, before or after a conflict.

Every situation demands uniquely appropriate actions. Following a peace agreement, a number of stages follow, starting with disarmament, demobilisation, pacification and reintegration of soldiers and fighters. Then come rebuilding of homes, facilities, transport and utilities; developing legal and administrative systems; building educational and social infrastructure; institution-building and restoring state accountability. This is followed by work on social trauma recovery and dialogue, justice and restitution, human rights, gender, minority, religious or ethnic tensions, stimulating economic development and environmental repair, and developing civil society, social norms and the private sector. Meanwhile, internationally, other countries, transnational institutions and NGOs need to embed a peace-reinforcing framework surrounding the country. At the time of writing, such measures as these were under way in 32 countries.

There can be problems. Outside intervention can spark local resistance or, alternatively, engender dependency on aid and peacekeeping interventions. Foreign peacebuilders can embody Western liberal or other values bringing forms of cultural hegemony that are not always suitable. Peacebuilding organisations sometimes impose what they are best at doing, not necessarily what localities actually need. Sometimes they introduce complications such as sexual abuse, disease, corrupt practices or unhelpful foreign money and ways.

Peacebuilding is important since warfare holds the world back, imposing enormous costs. Were such costs levied on belligerents, wars would quickly become less viable. War has customarily been treated as a financial write-off without a full cost-benefit accounting. Costs are borne largely by ordinary people, the environment, victims, losers and winners. The full spectrum of pain and damage is sidelined, and military-industrial and private gains are carefully concealed. This false accounting is becoming outdated since, in the 21st Century, narrow interests are being outweighed by global priorities. This is a matter of cost-benefit accounting: conflict destruction is becoming unsustainable and uneconomic.

The Institute for Economics and Peace identifies eight pillars of peace: functioning government, equitable distribution of resources, free-flow of communications and open media, good neighbourly relations, good educational and knowledge levels, acceptance of the rights of others, low levels of corruption and a sound business environment. It is a framework for a society to embed peace both domestically and internationally – systemic and society-wide, formal and informal, it builds resilience and adaptability and parallels the UN sustainable development goals. Global peacebuilding and sustainable development are thus branches of the same global project. The critical issue for the future is: when and how will peace and sustainability become the top priority in the global agenda, outweighing the factors that create conflict and unsustainability?

The future

It is possible that warfare ramps up in the future. With nations becoming more insular, competitive and vying for influence, and with non-state actors acting as a wild card in international affairs, there is a risk of a new level of warfare building up. But even if today's conflicts quieten, diplomacy

improves and global conciliation and cooperation somehow break out, there will still be a transitional role for armed services. As highly organised operational entities, they have a role in disaster and emergency relief, humanitarian interventions, dealing with piracy, looting, disrupters, critical resource, transport, aid and social protection, disarmament, logistical challenges or warlords seeking to undermine globally important functions or to oppress ordinary people.

Too often armed forces have been exploited in the furtherance of the aims of oligarchies, specific interests or questionable political perspectives – the 2003 invasion of Iraq was a good example. The goodwill and dedication of sincere, capable volunteers, reservists and professionals has at times been abused. This arouses questions around the politics of warfare. What is the distinction between a terrorist and a freedom fighter? Do armed forces exist to protect illegitimate oligarchs and governments? Do nations, however big, have a prerogative to impose their will on other nations, ethnic groups or regions because they have the military resources to do so? These are tricky questions without easy answers, but many of the geopolitical decisions behind the conflicts of the post-Cold War period have been unsatisfactory. Something needs to change.

If the world reduced violence by just 10%, this would generate $1.4tn, says the Institute for Economics and Peace. This is ten times the development aid given by rich countries to poorer ones and three times the earnings of the bottom 1.1bn of the world's poor people. Meanwhile, if war continues as today, it will hamper the possibility of resolving other major global issues such as migration, inequality, poverty, pandemic risk, population growth, food security, ecological repair, climate change adaptation and the whole range of issues covered in this report.

This is no small matter. War and 'defence' play a key role in determining our collective future. Seen in the round, this is ceasing to be a prerogative of individual countries: it is a critical global issue. A world populated by enemies is rent with hazards. It makes for dissonant worlds co-located on one planet, busily arming themselves against their fellow inhabitants.

While US president Ronald Reagan liked banging war drums, he played a key part in ending the Cold War. In a 1987 speech to the UN he said, *"Can we and all nations not live in peace? In our obsession with the antagonisms of the moment, we often forget how much unites all the members of humanity. Perhaps we need some outside, universal threat to make us recognise this common bond. I occasionally think how quickly our differences worldwide would vanish if we were facing an alien threat from outside this world. And yet, I ask you, is not an alien force already among us? What could be more alien to the universal aspirations of our peoples than war and the threat of war?"*.

Interesting links

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Part Three
Conclusion

"No matter by what various crafts we came here,
we are all now in the same boat."

- US President Calvin Coolidge, 1925.

Conclusion

There are two things to worry about. The ever-heavier imprint that our expanding population is imposing on the planet, and the risk that we won't properly control powerful technologies. – Prof Lord Martin Rees, UK Astronomer Royal.

A 2016 World Economic Forum survey of 26,000 Millennials in 181 countries concluded that they rated the world's top ten problems to be: 1. climate change and natural resource destruction (45%); 2. large-scale conflict and wars (39%); 3. religious conflicts (34%); 4. poverty (31%); 5. government transparency and corruption (22%); 6. safety, security and wellbeing (18%); 7. lack of education (17%); 8. political instability and lack of political freedom (16%); 9. food and water security (15%) and, 10. unemployment and lack of economic opportunity (14%).

One planet, many worlds

Our attitudes toward the future are influenced by our predispositions – we all sit somewhere on an optimism-pessimism spectrum. Attitudes are also affected by our situation, much depending on:

- *whether we live in the developed or the developing world*. Generally, developed world people are disinclined to change radically – many are reasonably comfortable, accepting that what they have is what life is about. Developing world people feel 'it has to get better than this', thus there is more impetus for change, and new thinking, innovations and possibilities are emerging as a result. These very different perspectives affect our perceptions of the future;

- *the generation we belong to*. With exceptions, older people tend to draw on existing thinking, positions and solutions, even feeling rather jaded, while younger people tend to look at the future with more imagination, questioning and sense of possibility;

- *our life experience*, and whether we have had a life of relative security, regularity and safety, or one of instability, risk and living day-to-day – and whether we see change and flux as threats, opportunities or more of the same old thing.

We live on one planet and in many different worlds. The main issue here is that our perceptions are very varied, and the future, riddled with uncertainties, cannot reliably be forecast. The judgements made in this Conclusion reflect the way the author assesses the possibilities and probabilities. In later life, by degrees he has changed from an earlier 1970s position when he considered the future to be potentially more catastrophic and also more transformative than he now sees it to be.

Many people believe what they are told more than what they see with their own eyes. Some want change as long as they don't have to change. Some take on the world's guilt, acting as its conscience in concern over the present, regret over the past or fear of the future. Some experience mental illness – indeed, it's a mad world, and perhaps they are more perceptive and less mad than many people want to believe. Some engage in self-sacrifice or activism to try to change things. Others just get on with eating their dessert.

Some believe a mighty conflagration will surely kill off most people except themselves. Some expect Jesus, the Mahdi or extraterrestrials to come down to save the world, or at least a select few. Some wish to impose their own picture of what's right on everyone else. Some of the super-rich fantasise about settling on an isolated island or even on Mars, leaving the rest of us to roast or fight it out. Most people just get on with life as best they can, with little time to think about big issues. This state of global disarray is a crucial matter because the world needs to unite around a shared mission – if, that is, humanity does genuinely wish its great-grandchildren to have a decent life.

Michael Herr, scriptwriter of *Apocalypse Now*, about the Vietnam war, once said: *"Those who remember Vietnam need to forget it, and those who have forgotten it should remember it"*. Similar applies to our awareness of the state of the world: its future needs to become a shared, collective concern, with the burdens and benefits of change shared more evenly than today.

Dissonances and Dilemmas

A global and systemic dissonance exists. Sectors such as the arms and the fossil fuel industries create jobs and generate profit, deemed *a good thing* from one viewpoint, yet they kill people, pollute landscapes and harm the world's climate, *a bad thing* from another viewpoint. Many such dissonances exist and we're faced with dilemmas and uncertainties that are often dealt with by disregarding whole swathes of inconvenient issues – but this is no solution.

Running a dissonant system like this is like driving a car with the handbrake on – it's heading for a problem. Before 2050 we'll probably find that such systemic inefficiency becomes unsustainable, prompted by events that precipitate issues, widen cracks and narrow options. It seems we are approaching a critical global reality check, or a series of them.

How successive UN Secretary-Generals sleep at night is one of the big unanswered questions of our era. They are among the few who take a genuinely non-national approach to things and they must be acutely aware of issues the world is evading, avoiding, denying and blocking. All they can do in their role is make the best of a bad situation, moving the world forward a centimetre at a time while knowing that progress is dangerously slow.

If ETs came down tomorrow, asking to be taken to our leader, how would the UN Secretary-General explain that he has insufficient powers to implement any recommendations they might surely make? Three of the UN's key members (USA, Russia and China) have a habit of vetoing proposals that are crucial to the world's future. These three powers possess enough weapons to end life on Earth, and the ETs might have good reason to believe that something is not quite right with that. It might also bewilder them to see that few Earthlings worry about it.

This highlights a core question: *we have little resembling world-scale governance* except for a bundle of transnational laws and institutions, to which quite a few UN member countries count themselves exempt. We also have an underperforming, underfunded UN held back particularly by nations' own self-interest.

Westerners in particular have a distrust in global governance, even though they initiated the globalisation process and shaped the world's transnational institutions. Enormous global bodies can be unaccountable and captured by elites, so many people are suspicious, but this does not remove the need for some form of global governance or solve the problem of arbitrating between self-interested sovereign nation states. Self-interest has led us into a global crisis. This is a critical weakness in humankind yet there's a paradox here: this very exceptionalism makes humans rather interesting, creative and culturally diverse – that's a strength, a weakness and a big dilemma.

Those of us who do our best to help the planet by using eco-products nevertheless pollute it by doing so in millions. If everyone used them we would have less of a problem but we would still have a problem – rivers polluted with chamomile and organic surfactants rather than polyphenols. A billion electric cars replacing a billion oil-powered cars is also a problem. As a mass of people approaching 8 billion in number, simply breathing creates an impact. So we have a further dilemma: even if we were all thoroughly eco-friendly and human-friendly, our vast numbers present an enormous planetary-management issue.

A big source of underlying collective guilt today is not badness and evil but complicity, indifference and omission – softer crimes in which we disregard and set aside important issues until we run out of distractions and alternatives. We are party to enormous crimes – such as the ubiquity of plastic in the oceans – yet, when such a problem is exposed, we look on in horror, demanding it be stopped

and quietly forgetting that we ourselves used plastics for our convenience and *we did it*. Meanwhile a lot of irreversible damage is done. This is endemic globalised cognitive dissonance.

Is Earth capable of supporting ten billion people in the mid-to-late 21st Century? No one knows: we are living in a global experiment to find out. But here lies a major clue: *much of the problem lies not in the size of Earth's population but in the way our population treats the Earth and each other*. Many people who die in earthquakes do so because of corruption, improper application of construction standards and lack of attention to earthquake-resilience. The impact of droughts is often increased by government policies and business practices, and by deficient public forethought – human stuff. This brings up a question frequently raised in this report: *who decides?*

So, *what should we do? How far does this issue go? How much change is needed?*

How, in some future time, will we know when we have rendered the world safe?

How will we know that we have reconciled the imbalanced equations we face today?

The equations *are* irreconcilable as things now stand. We know we need to wean ourselves off fossil fuels but we wait until we are forced to. Even if you are a climate-change questioner, just stick your nose by the exhaust outlet of any car and you will know quite quickly that fossil-fuel burning needs to end. Transitioning takes time and corporations supplying fossil fuels are 'too big to fail, too big to jail', so if such firms rapidly lost market value this could hit financial market confidence and the world economy. So the process goes slower than it should, and we are caught in a conflict between the contradictory rights and needs, real and perceived, of the individual (me in particular), social subgroups (us in particular) and nations (especially our own). In the meantime, we ignore the collective rights of humanity and the needs of the planet we live on.

As individuals we can make a difference only moderately, and such action is riddled with issues and compromises. The author's aid work with Palestinians and the Tuareg in Mali burns up air miles, energy in internet data centres, and it squeezes money out of donors who themselves are implicated in harmful activities, no matter how ethical and good-hearted they try to be. This report's production consumes resources and, the more it is read, the more resources it consumes, though its net contribution is hopefully positive. So damage is done even when we're trying to help move things forward. This is another dilemma.

There are clearly many small things we can do. Perhaps the simplest norms to follow are: *minimise harm* and *do to others as you would like them to do to you*. But none of us has the right or power to insist that others do what we believe they should do. So we have a freedom problem – our freedom is fine, but other people's freedoms create a problem.

Freedom is an asset we are unwilling to sacrifice, yet it becomes a limitation: to quote former BBC war correspondent Martin Bell, *"Peace and freedom can be defined as the peace that makes traffic jams possible and the freedom to sit in them"*. Personal freedom, jealously guarded by some and much sought after by others, is a resource that, like many others, has passed a peak. If everyone worldwide had a comfortable middle class lifestyle and a million in the bank, humanity would not survive. This is yet another dilemma.

Signs of hope

The developing world is beginning to build sustainability, affordability and simplicity into its ideas and development models, without suffering quite the same obstruction from vested interests and conservatism that the developed world suffers. They have their vested interests, yes, but not quite as deeply embedded as in 'advanced economies'. Improvements in the 'third world' follow a different, more sustainable track from that of the heavy-footprint rich world.

Of the big countries, the most sustainable (this may surprise you) is India, because a large proportion of its rural population lives simply, with relatively sustainable traditional patterns of

resource use – though many are poor and disadvantaged, and something still needs to improve for them. The country with the biggest and most proactive sustainability and resilience programme is China. The frontline of democratic development and good governance currently lies in Africa, the Middle East and Latin America. The centre of world manufacturing is Asia. The majority of world trade now passes between developing countries, home to 85% of the world's population.

In many nations across Asia, Africa and Latin America there is a significant sense of the need to attain greater sustainability and food security. This is seen as plain and simple commonsense, with little need for high-faluting terminologies and rationales. They're taking the best of the developed world's offerings but not the rest, and adapting them, innovating a lot and working out simpler, cheaper and more accessible solutions to the issues they face. This tide is gathering momentum. Increasingly it is driven by women.

New generations think differently. This matters a lot in countries where younger people are in the majority – mainly in Africa and parts of Asia. Ideas in USA, Europe and Japan tend to follow existing tracks and the higher income markets they cater for are increasingly part of the problem more than the solution. Meanwhile, the best young brains seek jobs in Bangalore, Shenzhen, Bogota and Nairobi. A gap is widening between younger and older parts of the globe and, in a world faced with insecurity and change, the younger will tend to prevail.

The 2-3 billion of the world's population at the low end of the market is an enormous market. Countries and businesses catering for them will do well. This population has the biggest economic growth potential and their need for high-utility, durable, repairable, no-frills items and solutions is not really understood in the stuff-saturated richer world. Richer people hire taxis for themselves while poorer people share taxis to cut costs – a simple sustainability solution. Ideas around sustainability are gathering momentum among even the least educated: solar power and cookers, dry farming, recycling, re-use and repair all make sense, and if innovations are cheap, simple and reliable, they will propagate vigorously.

There is an emergent morality amongst younger generations who connect the dots ethically and in terms of overall systems thinking. They see connections between things more clearly than previous generations. They see the paradox between plenty in rich parts and inadequacy in poor parts. They see the waste involved in conflict and consumerism. They're concerned about the inefficiency of a system that burns up resources, privileging some and disadvantaging others. This viewpoint is very logical and not exactly political. Yet it constitutes the politics of the future.

Large numbers of people alive today have an underlyingly positive attitude. This is so even if they feel they cannot do much in the larger social and political sphere, or if they are too busy to express their feelings fully, or if they fear coming out with their true values and beliefs. A strange attribute of civilisation is that we develop bicameral, schizoid double standards where we try to adhere to the rules and demands of society while nevertheless having reservations and deeper personal values. When it comes to the crunch, this delicate balance tilts, the hidden side of ourselves emerges and our values and actions can change significantly. This is a complex psychosocial dynamic yet it means that, when prompted by circumstances, human values can change quickly when the chips are down, especially when a momentum builds amongst large numbers of people.

These are signs of hope – though whether we see these as an asset or as wishful thinking depends very much on how we see things. Events of the 21st Century will test this, and much rests on it.

Future Scenarios and Probabilities

In the Introduction, four possible 2050 scenarios were chalked out: *manageable, difficult, disastrous* and *transformative*. It is time to review them again.

A Manageable Scenario

Most of us would opt for a **manageable scenario**, for obvious reasons. Much progress will be made with the right legislation, regulation, progressive taxation, technological change, universal education and healthcare, socially responsible business practice and implementation of the UN Millennium Development Goals, and some progress has already been made. However, much rests on the thoroughness, completeness and universality of implementation, not just appearances, iconic interventions and hollow claims. Herein lies a serious problem.

As things currently stand, systemic fundamentals are unlikely to change sufficiently under this scenario to make it really work. Socially and environmentally responsible business will develop to a point where investors prove unwilling to forego profit growth for overall environmental and social benefit. Governments will be proactive up to the point where they lose support from constituencies, media or the powers-that-be.

Put another way, the future will be shaped on roughly the same basis as before unless something happens to change our overall priorities. This critique is not specific to capitalism or democracy since other systems, socialist, Islamic, plutocratic, state-controlled capitalism or anything, are equally capable of wreaking similar damage: instead we must look at the mindset and the emotional disposition driving any system that exists. We need a revolution of the heart, and socio-economic and political systems will follow suit.

Many commentators believe that changes being made thus far are insufficient to counteract population growth, resource depletion, pollution, climate change, pervasive social problems and so many more issues. The 2015 Paris Agreement on climate change was insufficient even at its signing. When it takes years to ratify such an agreement, with some nations refusing or failing to comply, some submitting false figures and some masking their responsibilities, we have an implementation problem. More is needed.

A manageable transition needs to dig deeper, changing the roots, not just the branches, of human life. It involves more than converting to electric cars or establishing social enterprises, avoiding microplastics or reducing waistlines. It means addressing fundamentals and ensuring global compliance *without exception* – including USA and China. Such systemic changes require global consent, support and cooperation, and this looks unlikely.

Either this, or superpower force might be needed – but USA has had its chance and, while China could conceivably do similar, its capacity to dominate world affairs and apply force to the extent USA has done is questionable. China has succeeded in producing sustainable technologies that underprice older technologies, making them far more viable, but there is a long way to go. Some things, such as fast fashions, toxic chemicals, gas-guzzlers and convenient disposables need to rise in price to reflect their true environmental and human costs – and that's not China's speciality.

Things could change, but an almost miraculous global shift would be needed in three main areas: business needs to prioritise social, environmental and wider benefit over private profit; regimes need to shake free of oligarchic control, widening the benefits they bring and regaining people's support and trust; and ordinary people – electorates and consumers – need to be a driving force for change, willing to make sacrifices, setting aside self-interest, collectively acting for the global good. Unless such changes arise, an organised transition is unlikely.

A manageable option involves facing inconvenient truths, talking to the enemy, hard talk, working together, turning swords into ploughshares, social and international collaboration, forgiveness of the past and a genuine sense of being *in this together*. Otherwise a difficult scenario looks more likely than a manageable scenario.

To achieve a successful manageable scenario we needed to start around 1970, or latest 1990, when the evidence and knowhow were already sufficient. For a manageable option to work now,

measures taken would need to be draconian, and the world is currently unready and unwilling for that. Perhaps we need to be forced.

The various sections of this report reveal a series of issues that need to be addressed before fundamental progress can be made toward rendering the world safe. These include:

- population stabilisation and eventual reduction;
- economic reform to narrow inequalities and reconnect economic values with genuine energy and resource use;
- reformulation of societies to improve social justice, cooperation and basic contentment;
- worldwide introduction of universal healthcare and education;
- large-scale ecological, climatic and resource-use corrections and adaptations;
- harnessing technological and scientific progress to benefit humanity *as a whole*, to avoid dividing humanity into 'haves' and 'left-behinds';
- reduction or elimination of conflict;
- increased intercultural dialogue and coexistence;
- improved geopolitical cooperation;
- wholesale dietary and agricultural change and the establishment of food security for all;
- an ethical change to increase communal care, inclusion and empathy.

This is a tall order under current conditions. It is at present unlikely to be instituted voluntarily through international conventions or democratic and consumer choice. Something far more is needed to prompt such change. Hence that a manageable scenario looks improbable.

A Difficult Scenario

Perhaps we might enter a **difficult scenario**. We are likely to find out whether or not things are heading this way by 2030 or 2040. We might see more loss, deprivation, sacrifice, crisis and detriment than we prefer, and it could involve engaging in something like a 'war effort', with rationing, evacuations, mandatory labour and obligatory sharing. It could be an all-hands-on-deck scenario. Or it could be chaos and everyone-for-themselves.

This sounds threatening but, if faced with such a reality, humans have a tendency to get on with what they are presented with, when there is no alternative. Ahead of a crunch, anticipations can wax large and things can look worse than they land up being after the crunch. When reality strikes, a rapid shake-out happens and much changes. It's not at all easy, but life goes into a different gear.

At times and in places people could be faced with extreme emergencies. There could be tragedy, horror and destitution, as some people experience today, but more so and in more places. Much could go wrong – biodiversity loss, climate change, economic stress, food and resource shortage, social disintegration, geopolitical disarray and uncomfortable levels of hardship, cruelty and death.

A difficult scenario could see the overwhelming of social and government services, uprooting of populations, social unrest, conflict, piracy, armed convoys, intense climatic extremes and weather events, currency breakdowns, dictatorships and mad regimes, terrible moral dilemmas, battles over control of weaponry and strategic assets, technology breakdowns and a host of other problems. In such circumstances, the bit we can change is the way we deal with them: much depends on human responses, at street and village level, across civil society and in government.

The big question is: *do we fight amongst ourselves or do we pull together to share what is available?* Were there unstoppable mass migrations, how would recipient populations respond? If there were shortages and supply-line breakdowns, would we make do and improvise, or scrabble and fight? The choice is between degeneration, leading toward a disaster scenario, or the beginnings of a transformative scenario, leading toward eventual revival. Much would depend on leadership, social consensus and maturity, for a virtuous cycle of developments to lift off.

We would be presented with a new factual reality, with no going back. In such circumstances there can be redeeming factors: it is possible to live on one meal a day, and at least a billion people do so today; disasters and tragedies can prompt remarkable acts of bravery, improvisation, compassion, cooperation, resource sharing and sheer commonsense, amidst the devastation. Some people are already accustomed to it or they have living-memory precedents to follow. Solutions that previously were impossible because of laws, property rights, political control and customary default social patterns, suddenly become possible.

Crisis can loosen things up. This was demonstrated with the fall of the Soviet Union around 1990: things were very difficult for Russians but most survived, there was no ruinous civil war, there were no enormous disasters, remarkable exchange and barter systems evolved, and the vast majority lived to see another day.

So, in a disaster scenario there can be glimmers of light in a darkened situation and, although much can be lost, people often survive. In so doing, they become changed, confronted with moral options to work together, make the best of a bad situation and organise sharing and protection systems.

Change is accelerated in such circumstances since former realities have been swept away and people quickly grasp new behaviours as a matter of survival, setting the past behind them and choosing to operate according to a new moral and social compass. Those who survive wars or disasters often report tales of endurance, improvisation, courage, sharing and togetherness amidst the devastation and pain. Herein lies some hope.

But, this said, times of crisis can also give opportunity to advantage-takers, black-marketeers, troublemakers, looters, murderers and rapists. They can give an opening to dictators, populists, militias, 'false prophets' and exploiters.

Philosopher Bertrand Russell once said, *"War is not about who is right, it's about who is left"*. One observation from protracted wars is that sanity does eventually dawn – not least because people get plain tired of madness and hardship. Exhaustion can be the greatest of peacemakers. On this basis, if human society turns bad in a difficult scenario, fighting over peanuts, sanity eventually dawns amongst those who are left once the bullets run out and the atrocities get repetitively fruitless.

A difficult scenario could last for decades, testing people's capacity to persevere and survive. It could go through many phases, with worse and better periods. Attempts to revive could be stymied by socio-political situations, weather events, scarcities, fighting and mishaps – though equally there can be outbreaks of luck, genius, serendipity and energy. Experience and skill levels grow and social stresses can subside, be suspended or resolved, often by simple pragmatism. Any or all of these permutations can happen differently in different places.

A difficult scenario could conceivably lead toward a disastrous or a transformative scenario. We could be faced with serious global dissonance and dysfunction, making for painful conflicts of interest and encounters with hard reality. Or there could be a stand-off in which different parts of the world go their own way – though global threats such as climate change, nukes, pandemics or dictatorship wouldn't go away. Chances are that societies that cooperate and pull together might survive more successfully than those that lapse into tragedy and dissension.

Whatever is the case, humanity could survive a difficult scenario, emerging in a very different state – either transformed and following a path of revival or in a much diminished state but surviving. A billion people might lose their lives but many would remain. New generations would take the reality they are faced with and make something of it. We can only theorise and imagine what this would look like. But it is necessary and advisable for humanity to contemplate such a scenario. Is this what we want?

A Disastrous Scenario

A disaster scenario is unthinkable yet we must face this possibility. Humanity might have disappeared by the end of the century. Our lives may have become archaeological remains. It's over, and planet Earth becomes devoid of humans.

Some have visualised and warned of this and, while its likelihood is lower than that of a manageable or a difficult scenario, it is nevertheless possible. Today, we have the ingredients of its making – nuclear arms, toxic chemicals, climate-harming habits, dangerous technologies and natural risks and threats. What would happen next would be a geological and ecological matter since human presence would be gone.

Or perhaps 100 million people survive, picking through the rubble, making do with whatever they can find, dealing with deep trauma and possibly with diseases or disabilities such as radiation or toxic poisoning, and occupying a depopulated world with empty regions that are no longer wise or possible to live in. They might build shelters from old tyres and scrap, living on mashed ants, nettles and rare sources of drinkable water, with an occasional bonanza when a stash of stale coffee, tinned beef or a collection of seeds are found. The stuff of dystopian novels, this option is on the table and people need to look at it full square as a potential future option.

If there are survivors, governance as we know it would no longer exist. A money economy would be a thing of the past. Much would rest on the moral position most survivors had come to and the damage they will have sustained. Environmentally, many areas could be severely impaired, though other areas could start re-growing quickly in the absence of large-scale human exploitation. The world's climate could be significantly altered, with weather extremes and events common.

There would, however, be waste materials to pick over, and mining the remains of human life would probably be a rich source of resources and sustenance. Would it be possible to revive blast furnaces, mechanical diggers or at least some useful technologies or energy-sources? The capacity to repair or re-make simple technologies, such as forging tools, might exist. Rebuilding settlements, even towns, could be possible. Would there be sufficient available land for agriculture, or natural resources for hunting, gathering and fishing? Would humanity have a capacity for reorganising and restoring some semblance of organised life, perhaps over a few generations?

We cannot know. But we do have to consider a scenario in which a small number of survivors are faced with a very big world to reoccupy – and this has already been done in fiction and film. We can only hope that such a scenario does not become actual. But, if it does, there will be a quality of finality to it. The past will be a distant memory, leaving its signs in piles of waste, devastated landscapes, ruined cities and strange heaps of materials that new generations cannot fully fathom. It could take centuries for some semblance of revival to develop.

A Transformative Scenario

There is a fourth option: a **transformative scenario**. Since humanity does not have a habit of making the wisest of choices, such an unprecedented scenario would likely arise pragmatically to meet the manifest challenges of the time. It would represent an outbreak of commonsense and realism of a kind we see today only in individuals and small, localised groups.

This scenario requires a fundamental and universal makeover of our global mindset. The aims and rules of the game would change, with humanity, or at least sections of it, making fundamental choices obliged by the force of events, prompted by new ideas and initiatives and driven by a good shot of human spirit. In a cards-on-the-table scenario things that once seemed impossible can become feasible through the application of a hard-headed brilliance and a clarity of objectives that nowadays is unusual.

Something strange happens: when it all gets to be too much, we are stymied and former escape strategies fail to work. We reach a point of resignation, giving up. We cry our eyes out, feeling helpless. Then, something happens – a certain peace dawns. We're still alive. We look around and notice that the world has not ended and there's a silver lining to those dark clouds. This is where the transformation breaks through. It is possible, and there are small-scale precedents.

Actions taken in such circumstances can lead further than is understood at the time. The first steps toward the computer age were taken during WW2 without anyone really knowing it: developers believed they were cracking war-related cryptographic and logistical problems, while they were actually laying the foundations of the age of computers. WW2 catalysed a plethora of innovations, some problematic (such as nuclear arms) and some redemptive (such as plastic surgery or universal health and welfare systems).

Necessity is the mother of invention. Sometimes we find ourselves resolving more than we thought we were addressing. Suddenly we discover that a plate of potatoes is the best meal we ever had.

Some people today have a foot in this transformative world, changing their psychology and emotional disposition so that their consumption reduces radically, their relationships improve, they start on a path of self-healing and their understanding encompasses realities beyond those they previously had known.

Before such people make such a 'turning in the deepest seat of consciousness', they are inevitably confronted with a show-stopping crisis rendering former beliefs and behaviours obsolete or impractical. The chips are down and it can be a relief to start on a path of change, even when the benefits and outcomes are unknown and the means of getting there are yet to be learned. Transformation makes life simpler by cutting through to basics, removing unnecessary obstructions and uncovering straightforward, doable solutions.

Reality is made up of two things – *what is actually happening*, and *how we choose to experience it*. If the latter changes, our grasp of reality, objectives and possibilities change too. What was a problem becomes an opportunity and, at times miraculously, the objective facts of our reality start changing too. What was impossible proves to be possible, demonstrating that 'impossible' is a mindset reinforced by fear, guilt or shame, not an objective reality. At present we know no way to remove the radioactivity from nuclear waste, but this means only that it is currently impossible. But then, so were human flight, skyscrapers and electric power.

Landfill sites become resource mines, people with mental illnesses discover their genius, and polluted rivers become ecological redevelopments leading to far greater outcomes than just river-cleanup. As soon as a rectification starts, things work differently, and a problem becomes an avenue of progress – it's all in the way we see things. If international trade collapsed, then smokers would stop smoking and obesity would decline rapidly, simply because of scarcity – so is scarcity a bad or a good thing? Many problems are self-resolving when the overall context changes, or when a majority of people choose to follow a new path. Miracles can happen – after all, a miracle is merely something that we decide is impossible, but it happens anyway. In other parlance, 'black swans'.

But this can also take time and it can be grindingly hard. In WW2 the tide of the war turned in 1942 but it took until 1945 to end. Many of its worst aspects, in terms of hardship, devastation and death, emerged between 1943 and 1945, after the tide turned. It took until 1950ish for a postwar revival to begin, and until 1965ish for the past to start becoming history.

Looking back from the future, we might perceive that the period we live in today – perhaps the century between 1950 and 2050 – constituted the peak of the world disaster. We often think of disaster as something yet to come, but this arises from 'normality bias', a perception that our current situation is normal when in fact it is extreme and exceptional. Ours has been a time when we polluted and damaged the Earth to the maximum, expending vast resources on military hardware,

waste, compensatory consumption and systemic inefficiency, while poisoning ourselves, letting people starve and kill each other off. What a ridiculous time to be alive in!

Today, many people perceive that the future could be disastrous and that a transformative option is improbable or simply the empty dream of idealists and lefties. But this is a transitory perception of our time. Disaster can be a catalyst that forces us to embark on a path of fundamental repair and, in recent decades, the process has already begun – but now it needs to be escalated to priority number one. Our time is a bizarrely redemptive time when many big issues are getting worked out. Worrying things we see today are collective experiences obliging humanity to make fundamental evaluations and decisions. Perhaps we are living in a disaster scenario already.

We are faced with a big question: *what kind of trigger experience would make a substantial proportion of humanity commit to a transformative option?* An enormous crisis is not necessarily that trigger. In crisis, people tend to hunker down, stunned by the enormity of what is happening. It is often small but potent prompts and events that trigger major change. The Arab revolutions of 2010-11 provide an example: the trigger-point was the suicide of one young man in Tunisia – he was neither a prominent public figure, nor was Tunisia a central country everyone was watching. Several young Tunisians had committed suicide for similar reasons, yet they did not trigger change.

The potent issues symbolised in the young man's death prompted transformative mass movements to form spontaneously, without prior organisation or ideological preparation. People in Tunisia, Libya, Egypt, Syria, Yemen and elsewhere were ready for change and finally found a means to express it. The Arab revolutions did not succeed, but in the longterm they laid tracks yet to be trodden, setting goals yet to be fulfilled, and these will not be forgotten. Failing all else, the children of those who came out on the streets will move things forward anew. And those at the top who blocked change will be gone, or changed themselves.

It is not possible to identify what will trigger change, and many visionaries and revolutionaries have tried. But it is never triggered unless a potential for change is there – even lying quietly under the surface. Triggers turn a key for large numbers of people simultaneously and, once the wildfire starts, people who previously might never have contemplated pushing for change find themselves doing so – not least because it seems to be their only option.

In China, with the 1976 death of Chairman Mao and the rise to power of Uncle Deng, a change was triggered that made China, in forty years, emerge as a superpower capable of changing the rules of the game worldwide. This was an unexpected: in the 1970s, Maoism looked like a permanent fixture and transformation looked impossible, both to insiders and outsiders. An end to the Cold War division of the world into socialist and capitalist spheres also looked impossible. Impossibility is a precondition for transformation, and paradoxically it can sometimes be conservatives, not necessarily progressives, who bring it about.

Today, a resilient, sustainable, peaceful world looks impossible. Yet the need and the potential are there, and their probability of occurring is very slowly rising. This is happening in the background because, frankly, humanity doesn't know what to do – we just get on with our own little reality-bubbles and hope that the rest will work out okay. What prevents transformation is a belief that avoidance is still okay – we don't need to worry and everything is normal, even though we know it isn't. How a trigger moment might happen and who will bring it about is a mystery. But one guideline is useful: *expect the unexpected*.

Which scenario will prevail?

All four scenarios could apply in different parts of the world and differently to different people. The sumtotal of all this will become the overall global reality. For a period it might be very confusing. In our own day the best money, the most political support and the largest research grants are invested in a manageable option, while the best cinema box-office takings lie in a disastrous option. Business, media and finance buffs prefer business-as-usual, spiced with tweaks and adjustments.

Governments are notably unvisionary in their policies and practices, whatever their fancy words. Crisis advocacy is bad for careers, bad for votes, for market confidence and public credibility. Some will question the conclusions drawn here: they are welcome to suggest alternatives.

When the chips are down, our power to decide is not entirely in our hands. This is partially a consequence of leaving things too late. Many of the issues before us could have been addressed when we first became aware of them in the 1960s. Had we started changing things around 1970, we would have made noticeable progress by 2000 and, by now, further results would be emerging and we would notice their impact in very real terms.

There could be less conflict, fewer fierce weather events, less economic instability, a socially-richer society, less friction over religion and beliefs, far smaller extremes of poverty and wealth, fewer extinctions and fewer existential threats. Complications would have arisen but we would have had more time to deal with them. In failing to address the global situation in a timely way, we tempted fate, losing some of our options.

Therefore, it can be argued that we have left things too late for a manageable scenario to be realistic. For a manageable transition to succeed, the necessary changes would need to be more fundamental, systemic and deeply-rooted than most people would prefer to see. Under today's conditions, many would fight against such changes or attempt sabotaging them.

So perhaps a manageable scenario is less likely than many of us might prefer. This leaves a difficult or a disastrous scenario. If positive changes and adaptations were made soon, a disaster can conceivably be reduced to a difficult scenario – barring unknowns and black swans. But then, unknowns and black swans can help and resolve things as much as they create problems.

There is virtue in crisis, though it is painful, tragic and, to some, a killer, and it might hit you and me, not just other people. Its virtue lies in the fact that the chop comes down, removing many options and prompting definitive responses. Cascading situations can remove the possibility of default strategies such as throwing money at problems or sending in the army. Things could go downhill, moving toward disaster, or they could turn around, moving toward transformation.

Judging by our current behaviour, it is unlikely that humanity will transition directly from today's situation to a transformative scenario. We cannot entirely rule out this possibility, but it is more likely that we enter a difficult or a disastrous scenario first, perhaps within decades and for decades. There is then a possibility of transitioning to a transformative scenario, perhaps later in the century.

Crisis and Change

It is not possible to foresee every eventuality or to predict the course of future torrents of events, but certain critical issues could precipitate a deep crisis. Two things are important to consider here: *the issue itself* and its impact, and *the wider interdependencies and issues it affects*, bringing a risk of cascading consequences. These issues, presented below, are not listed in any order of likelihood, timing or impact, and neither is it a conclusive list.

- **The financialised and offshore economy** – turbulence in these sectors can destabilise real economies, transactions, trade and economic dependencies.
- **Critical market spikes** affecting commodity supplies, insolvency and social consequences.
- **Mass migrations**, sudden or spread over time, that are so large that they fundamentally change recipient countries and noticeably empty source countries.
- **Pandemics.** Whatever their cause, they can shock the international system, bringing multiple repercussions, causing large-scale mortality.
- **Sovereign collapse.** For fiscal, legitimacy, conflict or other reasons, some governments could lose authority and functionality, leading to complex 'failed nation' outcomes.
- **Disasters** – large or multiple, especially if they hit key cities, regions or economies.

- **Weather extremes and events**, if they cause multiplex outcomes with wider consequences.
- **Conflicts** – conventional, cyber or nuclear – hitting key world nodes, disabling the world system or creating global-scale impacts.
- **Political aberrations** such as shifts of regime, mass movements and socio-political situations that affect the wider world or change or disable the international system.
- **Food supply crises** with rapid-acting social consequences and wider repercussions.
- **Cyber-security risks**, affecting global operational systems.
- **Artificial intelligence** being misused, misaligned, introduced too rapidly or without consent.
- **Coronal Mass Ejections** – solar storms that can disable electrical and digital technologies.
- **Black swans.** Completely unforeseen triggers or tipping-points that could cause cascades of further events and consequences.

Before it happens, a crisis looks threatening. Once it hits, it quickly becomes incorporated into our reality as a new normal. We live in a crisis today. The key issue is that, in our time, the equations do not square up. There is a degree of will to address global problems but levels of commitment, priority and resources are insufficient. We are in a bargaining phase where we hope that, by making token gestures and the right noises, things will resolve themselves without demanding too much sacrifice, and meanwhile we can continue more or less as before.

At the time of writing (2018) a global economic crisis is foreseeable, yet it is unpopular to mention such an eventuality. It could be sparked by over-leveraged or zombie debt, Western or offshore economic subsidence, overvalued oil, banking or digital companies going insolvent, a blockage of the Persian Gulf or Malacca Strait seaways, an unexpected event undermining market confidence, or other causes. Then a series of events begin and we start entering a different landscape. Coming decades will probably see a series of crunch periods deriving from a number of sources, such as those listed above. Crisis becomes a game-changing catalyst of quantum adjustment.

We need to think the unthinkable, beyond our current mindset, stepping over our customary, cynical, tired expectations. This involves far-sighted, uncomfortable, outside-the-box thinking, embracing previously inconceivable possibilities.

An example: *antibiotic resistance*. The default response is to research ever new forms of super-antibiotics to replace old, ineffective ones – applying the same logic, this time with nano-medicines, gene editing and other biotech fixes. But this can be interpreted as 'kicking the can down the road', since further resistance and complications can foreseeably develop from such a strategy a generation or two later. Antibiotics work by killing harmful microbes and the principle of conducting wars against perceived evils is part of the old logic. The answer could be to change the logic, making friends with the enemy. Microbes, when threatened, either fight back or hide. So the answer lies in finding ways to pump up natural immunity, creating treatments that bond with microbes to satisfy their evolutionary needs so that they become harmless without arousing their evolutionary fightback potential. Thereby antibiotic resistance can be turned around. *Change the logic*. If we don't do so, we just get more of the same, further down the road.

Awkward questions, shifting contexts

Values and judgements can change. In Britain, most people believe we should 'save the NHS'. The National Health Service provides near-free universal healthcare, and this is *a good thing*. But wait, we need to think more clearly. To be blatantly forthright, the NHS is the biggest drug-pusher in town – it deals 'painkillers' and 'anti-depressants', sparking an opioid addiction epidemic. It kills people through institutional negligence and medical error, it hyper-medicalises the delivery of babies, even death, finding itself in a situation where its healing mission is arguably compromised.

Some wonder whether the NHS is primarily a healthcare institution or a Big Pharma moneymaking operation. Many of the best doctors and nurses leave the NHS to avoid burn-out, preserve their

sanity or help people in other ways. Something is very wrong with this. These are harsh and extreme judgements, but future generations could come to such conclusions, just as, today, we disapprove of the slavery, fascism, imperialism or 'dark, satanic mills' of the past. Situations taken today to be givens and facts of life can later be perceived as wrongs and crimes.

This highlights the mess we are in: a good organisation like the NHS can incrementally become part of the problem when it was founded to be part of the solution. This has happened in many sectors: perfectly normal, accepted benefits of today, such as mobile phones, antibiotics, agrichemicals, fish trawling, property appreciation, profitable financial instruments, corporate takeovers, arms sales and internal combustion engines are all candidates for the status of crimes against humanity or against nature. We continue permitting them while half-knowing this. Until perspectives shift.

American social commentator Michael Ellner bluntly puts it thus: *"Just look at us. Everything is backwards, everything is upside down. Doctors destroy health, lawyers destroy justice, psychiatrists destroy minds, scientists destroy truth, major media destroy information, religions destroy spirituality and governments destroy freedom"*. Fierce judgements but thought-provoking. If we are to get through the future successfully, we need to be ruthlessly honest.

What emerges from this report is that a transformative option is likely to be the most promising option if humanity is to reach the end of the 21st Century in something resembling good shape. Tackling problems on the same basis by which they were created is not a viable option – it could tip humanity from a manageable or a difficult scenario into a disastrous one. For a transformative option to come about, there needs to be a comprehensive outbreak of good sense, a corrective shift in the logic by which society and the world economy works.

To take one example, with conflict as a key obstruction to global progress, the world needs a thorough de-escalation of both conflict and all that feeds it – an oppositional, competitive psychology, inadequate domestic and international mechanisms for resolution of differences, an enormous arms industry, leaderships exploiting war and polarisation as a means of gaining or holding power and a public acceptance of force and violence as facts of life. Conflict de-escalation is easier said than done – having worked in Israel-Palestine and as a citizen of a militarised, arms-exporting society, Britain, the author knows this well. But it must be done: this is not an idealistic but a pragmatic, economic, realistic statement. *It must be done.* Or there will be consequences we might not want.

Much hangs around the question of power. Humanity has the means to get things right, but one key ingredient maintains the *status quo*: those who benefit most from it in terms of wealth and power naturally have an interest in maintaining their position, since in their experience it is to their advantage to be there. But the history of socio-political revolutions is not a happy one: hierarchies sit at the top thanks to a collective psychology that permits them to do so, and in times of change or revolution this psychology has a way of perpetuating itself in the form of new, updated hierarchies.

Thus, following the democratising dynamics of the early 20th Century, around mid-century we had Hitler and Stalin, later Mao and, in the West, sophisticated oligarchies that philosopher Herbert Marcuse once called 'the megamachine' – all totalitarian systems that were neither wise nor benign. They rose to power in the wake of rampant social change, modernisation and social insecurity. So revolution as we have known it is not necessarily a way forward for the 21st Century since it tends simply to substitute new winners for old, making old winners into new losers, whose fightback potential and capacity to block change can be considerable. Ordinary people, too, can feel better living in a secure system that hurts than risking unknowns that could make things better. 'Better the devil you know than the devil you don't'.

What changes things is the perception amongst hierarchies that, unless they change, they too will be losers. Thus, to retain power they must become genuine reformers or permit reform. As reinforcers of the psychology of dominance they hold a key role in deconstructing its psychology – though it is also true that 'when the people lead, leaders follow'. There is no magic answer to this equation of

power. But an underlying truth hides behind it: elites truly succeed when they act in the general good, without exclusion or exaggerated imbalances of wealth and power, and when power is based on merit and service more than inheritance or control of the means of oppression – security forces, media, religion or resource control.

To re-quote Georges Pompidou: *"A statesman is a politician who places himself [or, today, herself] at the service of the nation."* But also: the people will manifest true leaders when they create conditions wherein true, benign leaders might serve. The unifying link is this: *we are all in this together*. This maxim is truly transformative, perhaps the 21st Century's biggest lesson.

Last words

The way things currently look, we are heading for a difficult rather than a manageable global scenario around 2050. This could lead to a disastrous or to a transformative scenario and perhaps, for a period, to an uncomfortable mixture of both. However, barring serious mishaps, the author does not believe that humanity will destroy itself. It's more a question of how much pain and loss we must go through before breakthrough. We are in an historic crunch-period.

Predicting the future is a minefield, and the future landscape painted in this report might or might not turn out to be correct. But there is one important variable we must re-examine before we go.

Black swans: *events and trends that no one thought possible until they actually happen.* To remind you, this term arose because, up to 1790, everyone *knew* that *all* swans were white. Then, black swans were discovered in Australia and an impossibility became possible. This happened at the same time as the French Revolution, another impossibility that just couldn't happen, except it did.

History is packed with black swans. Unforeseeable quantum developments constitute one of the main forces shaping our world. Similarly, the future will be influenced by game-changing events that nobody (or very few) foresaw, and that everyone currently accepts to be impossible.

But here's the rub: speculating on the shape, form, timing and implications of future black swans is interesting but not at all reliable. To illustrate, try these four hypothetical black swan scenarios (and note your responses to them):

- *Instead of global warming we see rapid, semi-catastrophic global cooling.* An accidental nuclear war between India and Pakistan takes place that throws up so much dust and fallout that it causes a dramatic fall of world temperatures, leading to decimated harvests, loss of life and hardship worldwide. All because a military operative got things wrong.
- *Artificial intelligence disables itself.* A Silicon Valley AGI takes over key global systems until a Chinese AGI system hijacks it. Then an Israeli AGI, unable to do more, alters peripheral system responses to the Chinese system, making them behave erratically. The Chinese AGI tries many options, concluding that AGI systems are incapable of handling unprecedented situations such as this. Anticipating what humans would do, it disables all other AGIs, then disables itself and shuts down. Chaos ensues across global digital networks, power supplies, transport and payments systems, and the need for international cooperation is such that, *de facto*, national sovereignties are overridden, a global currency is instituted and world governance has been brought about.
- *India becomes the world's leading superpower.* Violent weather damage in USA, Japan and China leads to insolvency in global reinsurance markets, prompting a cascading economic crisis starting in London and Frankfurt and spreading fast. USA and China default and the dollar and yuan collapse. Shortages, migrations, terror and trade disruptions break out. Market demand for Rupees escalates. Europe, Russia, Brazil and other countries prop up the Rupee, and it suddenly becomes the world's reserve currency.
- *One person changes the global narrative.* A Russian oligarch's wife, known for her charitable work, is lost after a plane crash in Kazakhstan. After three years she appears in Turkey, having been freed from Chechen rebels. In the spotlight and righteously angry, she starts speaking out

candidly about global issues, oligarchies and deep-state power. Her statements go viral and within months she becomes a worldwide icon of change. Authorities try to suppress unrest and sabotage in many countries. She is assassinated. This swings even doubters and moderates against the authorities. The world narrative suddenly shifts against governments and institutions which, cornered, are forced to change their game. Radical regime changes and reforms follow.

These are hypothetical examples. Freak occurrences such as these work only if there is already an under-the-carpet potential for them to occur – even if few were aware of that potential until a defining moment arose. The game and the landscape change – it's a tipping or an inflection point.

One characteristic of black swans is that, once they occur, they are rapidly normalised. Questions are asked about why no one saw this coming, or why no one owned up to a truth that was visible but denied. We have difficulties with unknowns.

Nevertheless, the author regrets to remind you that *the future is unknowable* – until we get there. It will be a fortuitous mixture of known knowns, known unknowns and unknown unknowns. Until then, we can posit possibilities and probabilities, based on what we know. This is where we stand.

There is one other matter too. A wonderful poem by the late CBS news anchor Charles Osgood sums it up and it goes like this:

The Responsibility Poem
By Charles Osgood

There was a most important job that needed to be done,
And no reason not to do it, there was absolutely none.
But in vital matters such as this, the thing you have to ask
Is who exactly will it be who'll carry out the task?

Anybody could have told you that Everybody knew
That this was something Somebody would surely have to do.
Nobody was unwilling; Anybody had the ability.
But Nobody believed that it was their responsibility.

It seemed to be a job that Anybody could have done,
If Anybody thought he was supposed to be the one.
But since Everybody recognised that Anybody could,
Everybody took for granted that Somebody would.

But Nobody told Anybody that we are aware of,
That he would be in charge of seeing it was taken care of.
And Nobody took it on himself to follow through,
And do what Everybody thought that Somebody would do.

When what Everybody needed did not get done at all,
Everybody was complaining that Somebody dropped the ball.
Anybody then could see it was an awful crying shame,
And Everybody looked around for Somebody to blame.

Somebody should have done the job
And Everybody should have,
But in the end Nobody did
What Anybody could have.

Interesting links

Global Issues Overview, UN (*online resource*). http://www.un.org/en/sections/issues-depth/global-issues-overview/

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About the author

Palden Jenkins, born 1950, is a polymath thinker with interests in world history, geopolitics, social development, psychotherapy and matters of the spirit. A realistic visionary, he straddles that strange, uncomfortable gulf that yawns between mainstream views and alternative perspectives, between the majority world and the rich world.

He has worked as an event organiser and community leader, a counsellor and adviser, book editor, researcher, teacher, webmaster, archaeologist and humanitarian aid worker (Middle East and Africa). He has written ten books and a number of big public resources websites.

Palden started thinking about the future when studying social sciences at the London School of Economics in 1968-71. After this he entered a period of deep questioning and soul-searching following the partial failure of the summer of love and the student revolutions of the time, in which he was involved. He has developed his ideas ever since then through a long involvement in social, civic and aid projects, publishing and the movement for change.

Palden grew up in Cardiff and Liverpool, later living in Sweden and then in Glastonbury, UK. He now lives on an organic farm in West Penwith, Cornwall, UK. He has three daughters, one son and six grandchildren.

Some might reject his viewpoint owing to his involvement in subjects outside the boundaries of convention, yet over the years he has watched these boundaries shift as accepted ideas move closer to where he and people like him stand. History takes time to unfold.

This said, he would not lay claim to getting everything right, since evolving reality is greater and quirkier than any of us can encompass, no matter what our status, qualifications or authority.

We all need to do our bit toward creating a future we feel okay about leaving to our descendants. Because we are their ancestors and currently the matter lies in our hands.

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