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Review

Innovations and Trends©

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A B S T R A C T

Change starts in the minds of marketing and design departments. The two will forever argue who first dreamed up the idea. The innovation has to be wanted and be possible to supply so demand and production are equally involved. This article summarises changes taking place now in 2019 and predicts what is coming.

The purpose of this article is to help school leavers see their prospects and can be read alongside the articles I have written on careers and decision making.

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1.2. Medical

The big shift in the medical sector is the realisation that progress with pharmaceuticals has come to an end. The understanding that the body is biochemically dependant is now questioned because the electrical properties of the body are known to have more fundamental influences on health and disease. Drugs are not curing cancer, diabetes, damaged nerves and brain diseases whereas treatments using pressure and electrical fields are working.

This shift is good news for patients, will reduce time spent in hospital and allow doctors and nurses to be redeployed.

I have always argued that the government minister most responsible for health is not the Minister of Health but the Minister of Transport. Most travel is local between home, work and shops. These journeys are ideal exercise opportunities. They

can be done by bicycle providing traffic allows the riders to be safe. When cars replaced horses a hundred years ago, bicycles were quickly relegated to those who, it was said, could afford nothing better and cars were given priority. This is now changing with people finding that cycling is enjoyable and exercise is the best medicine. Redesigning roads and lanes in favour of cycling is already happening by following The Netherlands.

1.3. Security

Governments want to control everything, especially the people to know where they are and what they are doing. Whether the government is elected or an imposition makes no difference. The more control, the less the opportunity for people to disobey.

Security tagging already exists for pets. Some people can have electronic chips inserted into their body, usually between thumb and forefinger, that are recognised by scanners at doorways. The system can be expanded for banking and border checks.

The deal will be that without an implanted chip; a person will not get access to medical healthcare. That this is extortion will be overridden by the argument that the government is helping the people. It places the medical profession in the same category as the military, to fulfil government wishes. To a large extent, this already exists with medicine being the most regulated industry in the world. The pharmaceutical companies influence the government regulators and create a commercial environment suitable for their products.

Vehicle number plates are scanned and checked whilst the vehicles are in motion. The hardware and software have established the principle of tracking. Freedom of movement will give place to what will be called protected travel.

With everyone identified and located by massive computers, the role of the police changes to enforcement of identity. Supporting them will be individuals wanting medical treatment. In some totalitarian countries, that deal can be extended to free supplies of food. There will be accusations of slavery.

The scanning and tracking infrastructure is being installed and is called 5G, a powerful radio signal system initially provided for mobile telephones and extendable to all wireless communications. The electro-magnetic fields generated by 5G harm the immune system and cause illness further persuading people to need doctors and hospitals.

1.4. Energy

There is more energy available above the ground than below. What is below the ground has been stored there geologically from earlier times when the sun's energy created life that was left to decay and be submerged, covered and revealed millions of years later as coal and oil. Heat inside the earth can be tapped as an energy source but as it is usually where the earth's crust is unstable it is an unreliable source on a large scale. Geothermal pumps are already in use for heating buildings. Water is pumped into the ground where it gains heat and is then passed by under floor pipes around the building.

The political map of the world is shaped by energy supply and consumption. The oil wells of the middle east make the countries' rulers rich and volatile with the consuming countries of Europe their dependants. Recently the country producing most oil is the USA from fractured shale rocks, a process that seems able to stop and start according to the oil price. The OPEC group of oil producing countries try to restrict supply and conserve the valuable oil to raise its price. That encourages the American shale gas and oil producers to increase output with the result being a balancing act saving the world from high prices and shortages. This seesaw takes place with the looming increase in renewable energy creating doubt amongst investors about the long-term profitability of oil extraction.

It is not just that renewable energy is becoming competitive, it is also that energy consumption is better managed with improved insulation for buildings, more fuel-efficient vehicles and planes and the climate change issue bringing coal and oil into disrepute to encourage politicians to favour renewable energy.

The industrial revolution depended on energy from burning. It used ancient, stored energy which is finite in supply and releases carbons that are causing current global warming. Above ground energy is not stored; it is freely available from the sun, wind and flowing water, especially hydro-electric power (HEP). Technical means of harnessing this energy are improving to the stage where it can be economically competitive with coal and oil. It is also infinite and not damaging to the atmosphere. Norway and Scotland with mountains and regular rainfall have used HEP for decades. Africa could benefit from the same but rivers cross national boundaries and are needed for irrigation, not just their vertical fall, so political issues arise.

Siemens, a large German engineering company, had a plan to install solar panels across the Sahara Desert. The electricity would flow by direct current, not alternating, to avoid voltage drops, along many power lines to Europe. Huge battery storage would be needed to balance day production with night consumption. Off shore wind farms in the North Sea and Atlantic fringe were part of the equation and Siemens are now active in the North Sea from their base in Hull in Yorkshire. The Sahara project was massive but technically feasible on a large scale. The fundamental problem seemed to be political. It transcended political borders of unstable countries and investors could see destruction wrought by groups wanting to attack Europe by usurping their source of energy. The same already applies to pipelines crossing continents. They are always in danger of a terrorist attack.

Large overhead power lines cause illness, especially cancer, with their powerful electro-magnetic fields. It is far better to have small scale, local electricity generation powered by the sun, wind and biomass. By biomass we include crops grown to burn which, by growing more crops, maintains the carbon balance. It also includes methane from sewage and rubbish. These plants are already in use and more will be installed.

It has to be emphasised that nuclear power is unacceptable. The only reason it is used is desperation by governments unable to find an answer to the rising costs of oil and the pollution of coal. Nuclear, be it fission or fusion, is very expensive, incurs risks that persist almost indefinitely and requires power networks to distribute the electricity. Alternative sources of electricity exist and will become prevalent as improvements are made reducing costs and improving reliability.

A powerful, predictable and reliable source of energy is the sea; tides and waves. Quite why this has not attracted the same enthusiasm as wind and solar is unclear. There are now corrosion resistant metals to withstand the brine and plentiful designs to harness the movements of water. Tidal barrages across estuaries

gain support and are then criticised for disrupting fish migration although that can be solved with channels as used on river dams. Perhaps wind and solar is easier and when they have all been installed, attention may turn to the sea. After all, it is in the sea on the continental shelf that the largest wind farms are being erected. Rising sea levels are resisted around cities on estuaries with barrages in which water driven electricity generators can be installed; they run both ways on a rising tide or a falling tide.

1.5. Food

The species of Homo Sapiens is a plague. It has grown in numbers and inflicts harm on other flora and fauna either by eating them or harming their environment causing many to become extinct. This nasty species is us. Our success is in many ways due to our ability to survive on a varied diet. We are able to digest different foods and enjoy the variety.

When human populations began expanding in the 19th century, early economists such as T.R. Malthus predicted that the supply of food would reach a limit insufficient to sustain the population. That has not yet happened although his observation that food supply is finite is true. Increases in plant yields have kept pace with demand and improved transport has distributed food from areas of low cost to where it commands the highest price. This economically efficient arrangement is distorted by politicians imposing duties and tariffs according to their prejudices and xenophobia. Famines have occurred caused by drought, flood and pestilence but could have been ameliorated with political will. More devastating has been political interference in farming preventing the right crops growing on available soils. The big disasters were man made. The power of humans over other humans is exerted in many ways. I predict that medical care will be used as food has already been used. Disease and starvation should never be used to manipulate.

Yields will continue to increase and plant's resistance to infection will improve with genetic modification. Arable farming is capital intensive with productivity continuing to increase. Tractors are becoming self-driven and can run day and night. A farmer need not have employees. All the tasks are done by contractors. Combined harvesters now clear a field in less than a day whereas a hundred years ago all the village spent a week cutting and threshing. Ploughing and seeding is done in one pass in some cases. No fields are left fallow. Marginal land is used for biomass fuel crops.

Recent innovations have arisen in food substitutes. Vegetables are used to make a product that looks and tastes like meat. The justification is a fear by some people that animal muscle is unhealthy food and that killing animals to eat them is cruel. Some argue, without evidence, that large animals generate methane. Indeed, their digestion does generate these gases but the gases are balanced by the replenished grasses on which the animals feed. Very likely the new vegetable recipes will lead to processed food of its own identity rather than pretending to be something else. This serves humans' taste for variety and a desire for healthy food. Living off garden produce is the healthiest option pursued nowadays mainly by retired folk as a hobby rather than a serious nutritional project.

If meat production falls, the supply of skins and other by-products will fall affecting other industries. Already we have seen furs driven off the market by revelations of animal cruelty in the cause of fashion.

Developments in processing food made of insects seem free of sympathy for insects. The claims of high protein and minimal environmental impact are impressive. Mixed with vegetable flavouring, we could have new factory prepared foods. Worms from the soil are apparently nutritious and plentiful.

Vertical farming is an urban based development for plants grown in trays illuminated by artificial lighting for calculated hours to accelerate the growth of the plant. Controlled irrigation produces crops in boxes which would otherwise have to be transported across continents. They satisfy a demand for exotic foods.

Some foods are under attack for being unhealthy. Refined sugar is the main culprit and believed to cause obesity amongst people who used to be healthy when they were farmers but now, they can spend all day sitting down they eat sweets and fail to burn off the calories. Consumers know this but lack self-control over their taste buds. In The Gulf, 80% of the people are diabetic. The previous generation were farmers and pearl divers living off dates, fish and crops grown where they found irrigation. Then came oil earnings and a complete change of lifestyle. It is believed that they are genetically equipped for the life they led for thousands of years and in one generation are not able to change. If they could stop sitting down all day and go back to hard work under a hot sun their health would improve but they don't relish the prospect. The opportunities for women and men to exercise are not equal.

Drinks are also criticised. Those containing sugar are now being taxed to deter demand by increasing the price. Mind altering drinks also face restrictions. Alcohol is the main type with cannabis drinks entering the market where the law allows. Drinkers' behaviour is legally regulated and measured to determine whether they can drive or work under the influence.

1.6. Packaging

Packaging is an essential part of processed food. Its main role is hygiene then preservation. Polyethylene does this well and cheaply, almost too cheaply because polythene bags are used once and thrown away to become environmentally damaging litter. The cost effectiveness of polythene versus paper versus cotton is hugely in polythene's favour. Paper uses trees and a lot of water and cotton uses even more water. We need a material that performs the same as polythene for a limited amount of time, say two months, before decomposing back to vegetable matter. Plastics may always be needed. They have unique properties difficult to replicate with metals or wood. Ingenuity is needed to meet the specification demanded by an environmentally aware market.

Look at the Äänekoski bioproducts mill run by Metsä in the centre of Finland's forests. It processes 6.5 million cubic meters of wood a year using everything from the trees; nothing is wasted. They hope to find a better use for lignin, a cell wall polymer. Already they have a wood-based food packaging material that does not need a plastic liner so that it can be recycled without having to separate oil-based materials. The mill makes its own electricity from consumable waste and has a surplus it loads on to the Finnish power grid. That makes the whole process sustainable with net-zero carbon emissions.

1.7. Transport

Humans have always moved and in the modern world there is

much travelling for the fun of it. There are two aspects: moving things and moving people. Transporting things is called trade. It happens because places of supply incur a lower cost than places where the goods will be used. By lowering transport costs, trade increases. Governments tax trade for income and to inhibit trade by increasing the cost. Most international trade is by sea. Only high value, perishable items can justify airfreight. We now have oranges available in European shops all year. When the northern hemisphere growing season ends, supplies are flown in from the southern hemisphere. This innovation is technical and logistical. Retired passenger planes are converted to cargo planes to reduce the capital costs.

Vertical farming theoretically could compete with imported food but the scale of the operation would have to greatly increase.

For sea freight to get quicker requires more energy consumption that is not economical when it is oil that is being burned. If the energy could be from wind and sun the ship's engines could be smaller for the same speed of travel. After all, sailing ships preceded engine powered ships. There is much progress with sail assisted ships with the sails managed by computers adjusting the sails.

Overland travel could compete with sea journeys. There is now a rail link from China to Russia and Europe. It is quicker and shorter than the sea journey and avoids any political turmoil in the middle east. Whether a rail link would be viable from Russia to America via Alaska, I don't know. A tunnel between the two continents would only be twice as long as the Channel Tunnel between England and France. Railway tracks can be built in stilts penetrating below the permafrost.

Warmer seas are opening up the passages north of America and Russia to shipping for the summer months at least. Reinforced hulls will be needed. The geography is changing for bulk shipping. If oil ceases to be a major commodity, large oil tankers will be redundant. Compressed gas is piped from Russia to Europe. If electricity and heating come from wind and solar, less gas is needed and Russia has less leverage over its customers who have different political views. Trade always has political tensions.

Hovercraft and dirigibles are two technologies that have failed to fulfil their promises but so did electric vehicles before the improvement of batteries. If the skirts on hovercraft were the weakness, would a better material bring this land and sea vehicle back into use? Dirigibles occupy a gap between planes and ships. Although they can carry large loads, are they still too small to compete with huge container ships? Are they unable to fly in strong winds? Is this a technology unlikely to go beyond the Bodensee where the airships are seen floating around their base in Friedrichshafen?

Moving people is best considered according to distance. Over short distances, walking or cycling makes the person exercise and this is necessary to maintain health. A big mistake in the last hundred years has been to assume that people prefer to be idle. It probably goes back further. Royalty was waited upon so they were fatter than the servants. Effort saving was a selling point and customers bought labour saving devices until a household could be run easily allowing a couple to go out to work to earn enough to pay for the devices.

The journey to work for many is now done sitting down and at work they remain sitting down. If the job entails thinking, the brain consumes energy leading to hunger but without muscle movement the calories are stored as fat pending an energetic day or famine which never comes. The best answer is to walk or cycle to work. Paths and cycle lanes are needed. The shift in fashion has already happened making clothes suitable for exercise acceptable. In the last year, more trainers have been sold to women than high heels and the shift is notable amongst the young who see no sense in shoes that are difficult to walk in. Men have stopped wearing ties. Suits and jackets and going out of fashion.

Travelling by car in and through a city is difficult. Mass transit is the answer. It can take many forms. Underground railways were built many years ago and made cities like London and Paris prosperous. It is in this area that there is unlimited scope for ideas. They will all require funding so financial arguments will come into play.

Travelling longer distances within a country can be done by car but the ambition of planners is to make rail journeys more attractive. Railways are a revolution that replaced canal transport and are now undergoing a revival. They are now faster, quieter and often too expensive compared to driving a fuel-efficient car with four people in it. In other words, family travel is best done by car. It is door to door. There is scope for new ideas for railways and non-road travel. Suggestions include vertical take-off drone taxis but they will not have the capacity to carry the thousands entering and leaving a city every day.

Not travelling and communicating by video and phone instead is a practical alternative for desk workers. The time saved can be leisure or work. This is flexitime at its best. Video conferencing can be arranged for group meetings.

There is much talk about electric vehicles. They are not innovative. Along with steam power, they were on the road before combustion engine cars and were only superseded because a tank of petrol (gasoline) contained more energy than the equivalent sized electric battery. It is the improvement in batteries that are innovative although lithium-ion technology has been around for many years. Electric vehicles have fewer moving parts than combustion engine vehicles so with increased production volumes should be cheaper to make.

1.8. Artificial Intelligence (AI)

AI is a computer adding to its own instructions by analysing incoming data. This is the heart of the self-driving vehicle programme and already assists insurance companies and lenders. It is a massive database that will expand its knowledge and make decisions on behalf of humans who, it is believed, cannot amass as much information.

A troubling extension of computerisation is using sensors implanted in the brain to tap into thoughts that can be converted into digital data to instruct a machine or prosthetic limb. For disabled people, this is attractive but it bypasses the ability of brain repair. We accept that the brain is an electrical impulse transfer system. Providing pieces are not missing from trauma, inactive parts of the brain can be re-started by pulsing with electro-magnetic fields.

To tap into thoughts will cripple humanity. We are gregarious and need each other for survival. Telepathy inherited from earlier forms in our evolutionary tree is only present in a few people.

For most of us, we depend on language for communication. Anything else will isolate each from the other and destroy society as we know it.

1.9. Building and construction

After health care and food, housing has to be the most important requirement of people. There is always said to be a shortage. That means, the properties on the market cost more than most can afford. Houses can be bought or rented. Either way, they need to be financed because few people can pay cash for a house, especially those without an inheritance and entering employment. Manipulating supply and demand will affect the price of houses.

The cost of construction is a different matter. Lowering the cost increases the builder's profits and draws more builders into the market. The constraint then becomes land which is limited by planning laws. Few countries permit house building anywhere.

The traditional way to build has been laying brick on brick with load bearing walls. A variant of that is to assemble a frame of wood or steel to which a roof is added and then walls attached with an outer skin of brick, stone or wood.

Recent developments have extended the concept of pre-fabrication originally developed for emergency housing. Walls, floors and roofs are made in a factory with wiring and pipes installed so that they can be delivered to the site in flat-pack form on a lorry. The slabs are lifted into place and clicked and screwed together to make a building in a few hours.

This is called modular construction. It inevitably reduces individuality but variation is achieved by making components interchangeable so that houses of different sizes can be assembled from a kit of parts. Whether it is necessary for all houses to be different is questionable. Most housing estates consist of only three or four types of houses. Early industrial housing was entirely uniform and accepted because there was no alternative. Inside that acceptance lay an ambition to get a better house and when that happened the change in lifestyle was disruptive. An example of a development to ease the transition to new housing was the construction of the Byker Wall on Tyneside in the north of England in the 1980s.

Innovation is happening in pre-fabrication to reduce construction cost, allow variety and improve reliability. Better insulation will minimise heating or cooling costs. Hygiene improves with ample showers, toilets and cooking facilities. Sound insulation is important to let different age groups live in the same house each making their own entertainment noise.

Construction of roads and railways is determined by demand which is a function of distribution. Can the need to transport be reduced? Is it necessary to move goods within, say, ten hours or will taking twice as long at a much lower cost be just as effective? High cost infrastructure has to be planned in the wider context of the whole economy and the desired lifestyle. The belief that cars must be given priority was a mistake leading to urban planning that is making life in today's cities uncomfortable, expensive and unhealthy. The changes are large scale involving politics, local and national, which are influenced by academic advice.

1.10. Banking

Ever since fiduciary money replaced barter, money supply has been managed by banks. When money enters and leaves a bank, the bankers take a small slice of the value to cover what they claim is their cost. They found they could pay depositors interest to place money with them and lend that money to others at a higher price thereby making a profit. Bankers in Switzerland now charge depositors for holding their money in Swiss francs, an arrangement that is justifiable whilst the currency holds or increases its value compared to other currencies that are weakening.

Innovation in this form of banking is already advancing as fast or faster than the imagination can dream. Crypto currencies have developed to bridge the gap between gambling and investment and appeal to those unable to understand wealth creation.

Scope for innovation lies in replacing cash. Already cards embedded with digital identification are used for purchases. Sending money can be done at high cost through offices such as Western Union. Despite their charges, they are still quicker and less expensive than conventional banks. There is thus a gap in the market for a more efficient system. Accurate identification eliminating fraud allows transfers.

2. Limited Change

2.1. Entertainment

Some areas of modern life offer little scope for innovation. Surprisingly, one of these is entertainment. How it is viewed has changed from live performances to large screens and now small hand-held screens but what is viewed is much the same as ever be it sport or music. Participation is as open or restricted as it has always been with probably the only noticeable shift being away from the cruelty of gladiator combat and animal killing. Fighting in the form of boxing and wrestling persists and even rugby is a combat sport. Racing animals hardly helps the animals but humans love it and always did. These sentiments can change.

2.2. Clothing

Clothing is preferred in most climates and changes in style relentlessly. These fashion swings are only that, swings. Materials will change and there has been a shift away from fur in favour of synthetics. Discarding garments before they are worn out will become disreputable and create a market for making old clothes look different. That need to show change is intrinsic to dressing and yet it still requires the wearer to conform to the prevailing style. Sensing the trends occupies many minds.

2.3. Family

The family is an institution as old as humanity itself. That its members change is recognised by divorce lawyers and dating agencies but the arrangement in which children are reared will persist. This shapes housing and local travel requirements.

2.4. Education

Education implants knowledge of matters deemed useful in employment. It is seldom efficient and innovation is restricted by government regulation in much the same way that healthcare is controlled. Change will be slow with more control, not less. Higher education such as universities will develop according to how they are financed. Companies are already paying academics to further their message in support of their products.

2.5. Water

Water is essential for life. There is no substitute and supply is

limited. Desalination is expensive and only serves coastal cities although most of the world's people live within a few miles of the sea which is rising. Wars have been fought over water supplies and are likely in the future as dams restrict flow and climate change disrupts rainfall patterns. Recycling waste water is already happening. Towing icebergs from the poles to places where their melt water can be collected has been calculated as not feasible.

2.6. Space travel

Space travel is unrealistic. It entertains and attracts investors who play with money rather than seek growth. The notion of living without a breathable atmosphere and away from the Schumann resonance is dangerous to health. Problems on earth have to be solved. There is no escape. Brilliant minds expose their limitations when they talk seriously of being able to live in inhospitable places.

2.7. Retailing

There are now two types of shops: actual and on line. An actual shop is in a building or market stall where the customer is served by a human. On line shopping is done through websites and payment with a bank card. This has been around for so many years it is not now innovative. The general view is that in general, online sales will be 15% of all sales with some sectors being zero online and others almost 100% online. For example, it was thought that cars could be sold on line but buyers prefer to visit a showroom and have a test drive. Houses are advertised on line and buyers still want a person to talk to and show them around a house. Many components such as electrical and engineering pieces are almost entirely sold on line. One large warehouse can serve a country or continent with online sales and distribution by next day delivery.

Websites have replaced paper catalogues. Some sites include a sales section with a list of shops that the customer can visit. The fundamentals of retailing have not changed since market stalls were set up at cross roads. Websites are just bigger stalls. They also supply businesses and expand the supplier's reach into the market. The innovation came when the internet was developed. Retail banks have tried to move their business online and have closed branches. Whether that will persist remains to be seen. There will always be a preference to meet face to face.

Human behaviour is best understood with reference to our origins. For most of human existence, the day was spent hunting and gathering food. Evenings were social times and nights were spent sleeping. It is the foraging instinct which supports the retail industry. To a limited extent, browsing a website is satisfying but never compares to the seeing and touching of actual shopping. It is this inherent behaviour that will sustain shopping in towns and cities. The layouts will change according to fashion swings just as clothing and pop music changes whilst the fundamentals remain.

3. Conclusion

When the human brain gained the ability to be ambitious, use tools and make changes the disruptions have happened faster than the rate of evolution allows us to adapt. This rate of change is now more than it has ever been in human history. For most people, it leads to turmoil. The only way to survive or maybe prosper is to know what is going on; be in the lead or avoid the danger.