The ECM Growth & Innovation Fund (GIF Fund)

While we have successfully invested in and written about GIF companies many times, this is the inaugural newsletter for the Effectus Capital GIF Fund.

The GIF Fund is focused on tapping into the growth opportunities surrounding the technological megatrends taking place globally on an unprecedented scale. There are numerous great innovations taking place which in and of themselves will have a profound effect on the world.

When added together however, the collective impact will be far greater. It will change the way people live, work, communicate, socialise and more. Of equal importance, however, is the opportunity to create generational wealth by tapping into this tsunami of change.

The key to understanding (and thus investing in) the global growth impact that we expect to see over the coming years and decades even, is not to look at individual technologies or innovations in isolation but to understand the interrelated nature of things, the new opportunities and synergies created, and the collective incremental gains magnified across a multitude of sectors, industries and companies. The weight of accelerating numbers at the margin.

We believe an incredible opportunity exists to invest in companies that best capture these trends and thereby harness the future growth potential. One just has to look back at the staggering returns of early investors in computers or the internet to get an idea.

In understanding the potential for future growth, we need to understand what has gone before.

What makes these so-called megatrends and transformational changes sustainable?

How much of an impact on global growth, productivity and corporate profitability will they have?

Why all the fuss about the so called 4th industrial revolution? Why is it happening now? What will the impact be?

At ECM we have studied history for context as to where mankind stands right now. We have investigated the evolutionary timeline of modern man and the impact of each prior revolution: the cognitive revolution, the agricultural revolution and now the industrial revolution, which is in fact multi-faceted and still evolving (as we currently move into the so-called Fourth Industrial Revolution).

The world has already experienced 3 industrial revolutions:
• The advent of the steam engine and mechanisation
• Mass production, electricity and science
• The digital revolution (computers and IT)
(For a brief history on the evolution of the revolutions, please refer to the Appendix A).

Key features of each preceding revolution
All previous industrial revolutions were characterised by the emergence of more than one significant innovation or new technology at the same time and resulted in massive step-changes in the way people lived, worked and socialised.

The 4th Industrial Revolution is seen as the convergence of people and technology. It is the merging of the physical, digital and biological world. The key to understanding this new revolution is to understand the key technologies and innovations that are converging right now to lay the platform for this irresistible wave of change.

What is also clear to us is the rate of change in new technology and innovation, a trend witnessed in the previous industrial revolutions, continues to accelerate. The rate of change is in fact exponential, and along with it the opportunity to create wealth as massive new industries and corporations are created and developed.

What are the building blocks in place today that are converging and allowing for this new era of innovation and technological megatrends?

Computing power (Semi-conductors)

Semi-conductors are the enablers of technology. They are in every computer, transistor and sensor. Massive and still accelerating computing power in the form of powerful semi-conductors. With the aid of Moore's Law, computers have become ever smaller, cheaper and more powerful enabling massive computational efforts at ever lower costs. Semi-conductors themselves have become the subject of innovation and advancements.

Powerful semi-conductors (such as GPUs) are especially well suited to artificial intelligence (AI) and machine learning (ML).

What about capacity limits of silicon-based electronics? Moore's Law is slowing down with respect to computing capacity however we foresee new materials such gallium nitride (GaN), scandium and graphene and carbon nanotubes will pick up the slack when the limits of silicon technology in semi-conductors are being reached.

Big data

Massive data generation: By now almost all of the world's historical data has been digitised. More than that 90% of all data in history was generated in 2015 and 2016. Added to this is the fact that the total digital universe of data is roughly doubling every two year and should reach around 40 trillion gigabytes of data (i.e. 40 zettabytes) by the end of 2020 from only 1.2 zettabytes in 2010.

Internet of Things (IoT) and sensors: This generally refers to every connected device. The ability to extract and record data from billions of connected devices without human intervention. While not all of the data is valuable, extracting value from this data on a close to real-time basis is key. Sensors have also massively enhanced the quality of data being generated.

Data storage and Cloud Computing: Not only are we generating vast quantities of data, but the capacity exists to store the data in massive data centres (cloud storage). The advent of cloud storage has opened up a world of possibility and completely changed the way we view stored data. Gone are the days of mainframe computers and obsolete hardware, now everyone has access to almost unlimited and secure data storage capacity at a reasonable price.

Data Accessibility: Readily available and massive quantities of data, cloud storage, data streaming (fibre and soon 5G) and Internet of things.

Data Analysis: Data only has value if it can be analysed. The data with potential for analysis is now close to 37% from 22% in 2012. We now have the computing power to analysis and sift through vast quantities of data and ever-increasing rates.

Data Security: These massive quantities of stored and constantly transmitted data need to be secured and protected spawning the massive cybersecurity industry.
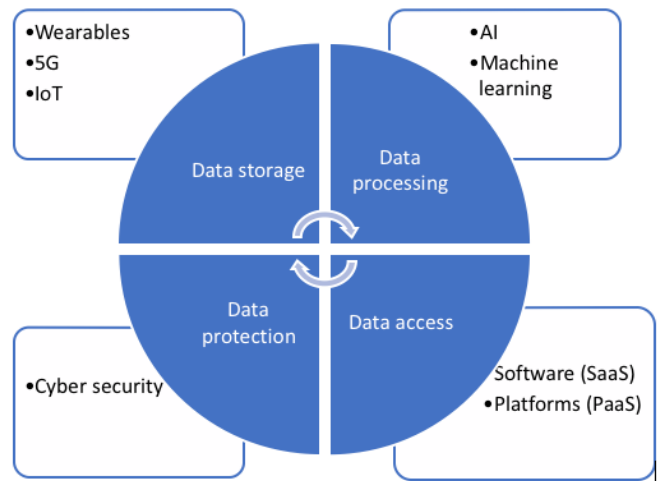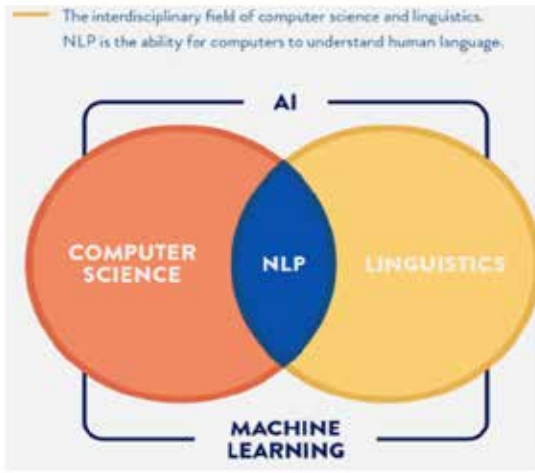

Artificial Intelligence

While AI has existed for decades, what's different now is that both the data and the computing power are available to begin pushing the boundaries. We are still in the early stages of seeing the benefit and value add for global corporate earnings from machine learning, data science and neural networks.

The beauty of AI is the ability to add value to every single economic and social sector and every single company in the world. The opportunity does not exist exclusively for the global mega-caps but also for local companies everywhere to leverage their domain expertise.

As AI goes further mainstream the benefits will move well beyond the current targeted advertising and consumer profiling to every step of the corporate process (operations, manufacturing, sales and marketing).

While much of today's AI is closer to statistical analysis on a massive scale than it is to true artificial intelligence, Deep learning and Neural Networks are quickly moving to centre stage. We expect high growth in areas such as Natural Language Processing (speech recognition) and Visualisation (autonomous vehicles).

The interdisciplinary field of computer science and linguistics. NLP is the ability for computers to understand human language.

Software, software, software

With the availability and accessibility of so much data the possibilities are endless. Software is the actual program, it forms the guiding hand, the tool with which all the opportunities can be tapped. Software exists on every level: managing the data, analysing the data, interfacing between applications, marketing, processing and securing data. Software is the delivery mechanism of every application, program or set of instructions related to using data and technology.

A significant industry that has emerged is SaaS – software as a service – the sales and management of software applications made available to users over the internet and leverages cloud storage.

As Marc Andreessen famously once said: Software is eating the world.

3D printing

3D printing has been around for over a decade now. What needs to be understood is that prices have fallen dramatically in a 'Moore's Law' type of fashion and a multitude of new materials have been developed.

3D printing is one of the key enabling and realisation tools for many the innovative solutions we will see in the future. It means complex ideas can be brought to life and tested quickly and accurately. Every advanced factory in the world already incorporates 3D printing into their processes.

It will proliferate in areas such as medicine, manufacturing, construction, technology and design.

Robotics: the ability to control highly complex processes using algorithms and microsensors is leading the evolution of robotics well beyond highly complex manufacturing into the world of consumer robotics, and service robots (e.g. precision surgery).

What are some of the key beneficiaries of these building blocks?

Edge computing: enabled by ever growing computing power in ever smaller sizes, much more computing and processing will be performed on edge devices such as mobile phones, smart watches, household devices (think smart homes, smart watches etc.) rather than via transfer to and from cloud storage.

This will enhance cloud computing systems and the response time and usefulness of information processing will happen in real time.
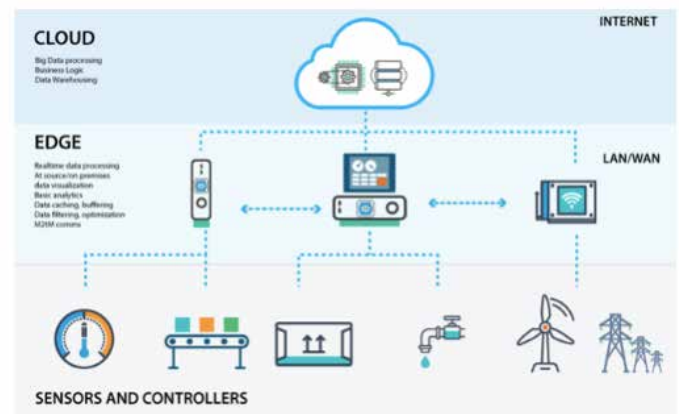
Genome sequencing and editing: AI enabled. The first human genome took almost 15 years and $2.7 billion to complete. Now it costs roughly $1000! This is perhaps the area that has the greatest potential for innovation and change. It has opened up new realms of medical innovation such as gene-editing (e.g. the ground-breaking CART therapy).

Nanomedicine: the combination of AI and nanotechnology is being used to enhance the delivery mechanism and customise release profiles of medications and treatment. For example, edible microchips could release drugs at pre-programmed intervals or target specific cells or tissues.

What do we see as some of the dominant technological trends of 2020?

Augmented Reality: a combination of virtual reality and reality.

AI as a service: As more companies turn to AI as part of their data analytics we expect to see significant growth in AI as a service. This can assist where there is shortage of software engineers and will allow companies to bypass the process of in-house development and accelerate adoption.

Precision Medicine: The move away from the current one-size fits all approach is a massive step forward in the healthcare industry. Treatment breakthroughs in any number of areas such as oncology and age-related diseases (Alzheimer's, Parkinson's) are on the near-term horizon and we expect this to begin taking centre stage.
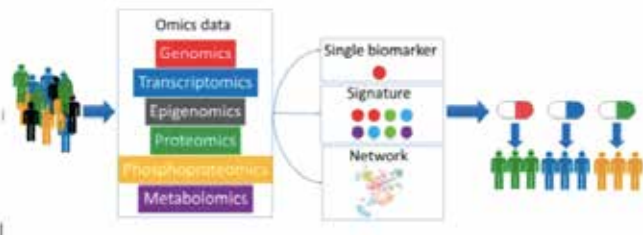
Industrial Internet of Things (IIoT): The use of internet of things technologies to enhance manufacturing and industrial processes. Industrial organisations will digitise operations and optimise every facet of their operations productivity, health and safety, production costs and machinery operations and sales.

Machine learning and big data technologies will be applied to sensor data from a network of connected devices creating systems that monitor, collect, analyse and deliver valuable insights.


Robotics: Service robots are fully or semi-autonomous robots used to assist humans. The growth in service robots is expected to exceed that of industrial robots. The advances in computing power, sensors and AI have led to a rapid growth in the capability of service robots. The need for ever growing warehousing, delivery and light logistics means they are proliferating in places such as fulfilment centres (think of the growth in online shopping, food delivery etc.). We expect this trend to accelerate into 2020.

Blockchain: It's not about Bitcoin...Blockchain technology will transform industries. While much of the initial investment in blockchain took place in the financial services industry, projects are underway in cybersecurity, healthcare and agriculture. Obvious benefits include reduced costs, eliminating the need for middlemen, reducing fraud, secure and fast contracts to name a few. Ready to use software is already available from the likes of Amazon, IBM and Oracle.

5G: 5G is already here. It is being rolled out on a large scale in some international markets. The prospect of data transfer at speeds that are multiples of fibre has implications for rapid response applications such as Autonomous Vehicles (AVs) and cyber security.

Thanks to 5G we expect AVs to significantly exceed current 5-year growth projections as the data intensive Lidar-systems become fully effective.
To give you an idea of the speed of 5G have a look at the comparison below.

5Gs: Wireless Technology side-by-side comparisons
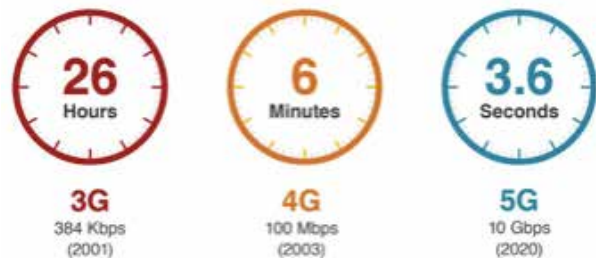
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Rise of the Millennials: Global spending power is shifting to the millennial generation and with it the changing consumption habits. Millennials are the largest generation in history and the millennial population in China alone is larger than the entire US population.

Millennials demand more environmental awareness, they demand experience over materiality, they are quicker to adopt new technologies and they vote with their wallet. Significant trends and spending patterns are emerging as this population demographic asserts itself as we have already seen in music and video content streaming (Spotify, Netflix), soon to be followed by cloud gaming and game play streaming (Steam and Twitch).

Clean Energy and Electric Vehicles: As climate change and ESG take centre stage, clean energy's cost curve has driven prices ever lower. We expect renewed focus on clean energy technologies such as solar, hydrogen fuel cells and wind. Critically the ability to store energy has rapidly evolved and intermittency issues are being resolved.

The introduction of blockchain and IoT will enable efficient and real-time energy storage, ustilisation and supply.

In line with the demands on clean energy we expect the continued rapid adoption of electric vehicles to accelerate as costs come down, driven mainly by lower battery costs which is the biggest individual cost component (Wright's Law predicts an 18% cost reduction for every double in units produced).

Augmented reality in conjunction with 3D imaging and realisation: AR has significant applications across a number of industries and we expect the adoption to rapidly accelerate this year.

Some examples include of AR application:
• Consumers can try on clothes or new hairstyles in the mirror
• Manufacturing companies can rapidly visualise and develop new products
• Interactive education and travel and leisure experiences
• Medical surgery

What are we investing in?

Our preference is to look for companies that are best in class with a sustainable technological advantage or innovation edge. Typically, they have two main forms: We are investing in **niche innovative disruptors** that operate in massive industries with high growth trajectories and long timelines that are ripe for real disruption (healthcare and healthtech is an obvious example).

We invest in **innovative aggregators**: companies that harness convergent industries and technologies to create powerful self-reinforcing platforms for growth and expansion. For example, companies that incorporate big data, cybersecurity, networking, cloud storage, SaaS and AI-as-a-service.

Conclusion

Over the past 4 years, ECM's unique technology and innovation lens has successfully helped to identify and invest in the kind of opportunities described above and is positioned to realise the massive potential we see over the next 3, 5 and 10 years.

Appendix A: The brief history of revolutions
Mankind as we known it has experienced three primary revolutions.

Circa 60-70 000 BC: Communication Revolution: The ability to pass on information and communicate through more than genetic coding. New learnings could be handed down and transferred more rapidly and effectively.

Circa 10 000 BC: Agricultural Revolution: The migration from the nomadic lifestyle of foraging and hunting to planting crops and domesticating animals. This allowed for food storage and mental development.

Circa 1750 to current: Industrial Revolution: There industrial revolution refers to the previous periods in history when step-change advances in technology led to significant and irreversible leaps forward in man's economic and social evolution. These periods were also characterised by massive generation of new wealth.

Revolution 1: The steam engine, water power and mechanisation
During mid-1700s, the steam engine powered the introduction of factories, railroads and steamships. It also revolutionised agricultural production. This was also the advent of mechanical production, moving beyond the physical efforts of men and horses, wind and water. (New energy source, new communication, new financial system).

Revolution 2: The Age of Science, Electricity and Mass Production
From the late 1800s to the early 1900s, science and invention transformed human life, economy and productivity by the advent of mass production in manufacturing and consumer goods.

Inventions such as electricity, gasoline engines (think cars and aeroplanes), chemical fertiliser, the production line (mass production of goods) and new materials such as steel.

Other notable inventions include the telephone, electric lights, radio. (New energy source, new communication, new financial system).

Revolution 3: The Digital Revolution
The third industrial revolution began in the 1950s with the advent of computers and semiconductors. Information technology and digital systems changed the way we processed and shared information, the way we communicated and incorporates the invention of the internet (which actually began in the 1950s as well). We are still partially in this revolution and it has paved the way for what comes next.

Revolution 4: Technological and biological convergence: Beginners guide the Fourth Industrial Revolution
All previous revolutions were characterised by the emergence of several key technologies and innovations at the same time. The key to understanding this revolution is to understand the key technologies and innovations that are converging and enabling right now.

Massive advances in computing power, the data generation and measurement and ready access cloud storage have laid the platform for a new wave of technologies that are rapidly unfolding.