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From time to time a development takes place in our economy which has the potential to be truly transformative. Roger and I believe that the rapid development in Artificial Intelligence in the past year is one of those instances.

Roger and I have been investors for a long time, and over our careers we have witnessed many changes in the economy, in the world, and in technology. Over my career as a fund manager of international portfolios, I was an early investor in developments as the opening of Chinese economy, the fall of communism in Russia and Eastern Europe, and the development of emerging markets around the world. In the mid 1990s, I invested in international companies which were at the forefront of the internet and mobile communications revolutions, including Nokia, Blackberry, SAP, and Taiwan Semiconductor. In my view, Artificial Intelligence has the potential to be as meaningful as any of those developments. While there has been a lot of attention paid to it in recent months, we are at the very early stages of its impact on our world.

As with any new investment theme, it will take time for investors, companies, and consumers to sort out what it all means. Some of the early leaders will be successful, others will fail. In some cases, AI will be built into existing products, in other cases entirely new business models will emerge. (For example, in the early days of the internet few envisioned that social media would be as pervasive as it has become.)

Our clients currently have meaningful investments in this emerging sector through holdings in technology stocks which are leaders in AI innovation. (These holdings are mostly through funds or managers we have selected.) We are seeking to identify emerging companies in this sector.

In addition to the benefits of AI, there will be well-founded concerns about the risks. It has been estimated that AI might replace millions of jobs, be used to spread misinformation, or be used to undermine our democracy. While these concerns are important and need to be addressed in a meaningful way, we should also keep in mind that every new technology has been greeted with similar concerns. We are optimistic that the risks of AI will be meaningfully addressed and that that the benefits will prove to be greater than we can now imagine.

Please find below a commentary from Roger expressing his views on this topic. As always, please feel free to call us if you would like to discuss this or any other issue.

Best Regards,

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Chief Investment Officer and Partner

The Transformative Artificial Intelligence Revolution

By Roger Johnson

In the course of human history, the three most transformative periods have been:

- The Agricultural Revolution (10,000 BCE),
- The Industrial Revolution, (18th-19th century)
- The Information Age (20th-21st century)

We are now entering the **Age of Artificial Intelligence** which has the potential to be as significant as these previous periods. Venture capital investor Kai-Fu Lee has argued that the impact of AI on society will be as significant as the impact of the printing press, the steam engine, and electricity. Elon Musk has stated that within a few years computers will have Artificial General Intelligence, which will let computers replicate virtually all types of human intelligence.

The term Artificial Intelligence was first used in 1956 when a group of top researchers from institutions including MIT, Harvard, Carnegie Mellon, and Stanford met at Dartmouth during the summer. Since then, there has been an effort to create more and more sophisticated computers, with the goal of one day creating machines that could replicate or exceed the performance of the human brain.

While AI is a single term, there are many related technologies involved in its development. Four of them are particularly noteworthy at this point. Neural Networking refers to hardware and software which are designed to replicate the way in which the human brain solves problems. It is used to create the large language models which power such programs as Chat GPT and Google Bard. Quantum Computing refers to the development of a new generation of computers which use principles of quantum mechanics to process information instead of traditional computer chips. These computers have the potential to be at least 10-100 times faster than the fastest computers which exist today. Supercomputers are the massive computers used to solve the most difficult and calculation-intensive computational problems today, including those for AI. Finally, advanced lithography refers to the technology used to make machines which produce today's fastest computer chips.

We have identified and invested in leading companies in several parts of the AI sector and believe that these companies will be significant holdings for many years. (Obviously there are no guarantees, and we could be wrong.) Given that both established and emerging companies are pursuing opportunities in AI, it is likely that AI investments will include both large cap and small cap companies.

In many ways this period reminds me of the early stages of the genetic engineering revolution in the 1980s or the personal computer, software, and internet revolutions of the 1980s and 1990s. In each of these cases there were companies which were identified as promising in the early stages. Some of these went on to become stellar performers, while others soon flamed out. In my experience, the best way to invest in a new industry such as AI is to identify the most likely winners early, and then make portfolio adjustments as the industry evolves.