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White Paper

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Disruptive Technology Primer

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A primer on just a few of the disruptive trends Emerald's investment professionals are anticipating and will be writing about in the coming months

Introduction

Since Emerald's inception as an asset manager almost 30 years ago, the world has seen tremendous technological, medical, financial, social, commercial and industrial disruption and innovation. Innovation that has changed every aspect of our lives. Emerald's doctors, PhDs, industry specialists and finance veterans have invested in multiple facets of those technological advancements. Some of these revolutionary improvements have included electronic health records, telehealth, genomics, vaccines, diagnostics, social media, gaming, shopping, digital payments, food processing and safety, software and services and alternative energy, just to name a very few. We believe that Emerald's early identification of companies involved in emerging trends, therapies, applications, systems and technologies has resulted in strong investment results for nearly three decades.

From its early days Emerald management made it clear that not understanding a selected technology would not be an acceptable excuse; that Emerald would employ the resources necessary to fully understand potential innovations and their investment implications. This commitment to understanding the investment relevance of innovation and change has resulted in Emerald's portfolios holding some of what we see as the most dynamic high growth companies in the domestic investment universe.

Just a few Innovative/disruptive trends we identified early over the past few years and were able to bring to our clients include:

- Digital learning and support platforms;
- Telehealth and the growing appreciation of health, nutrition and wellness (suppliers, platforms, manufacturers);
- The explosion of orphan drugs and targeted oncology;
- A.I and Machine learning advancements in the data center;
- Network infrastructure improvements such as 5G;
- Advancements in alternative energy – equipment manufacturers and suppliers- solar and hydrogen.

Going forward, the rate of innovation in the sectors and industries in which we invest is only accelerating. In addition to doctors/PhDs and industry veterans, Emerald employs a former venture capitalist, public policy experts and strategists to identify, evaluate and research such advancements to ascertain their viability for portfolio inclusion. Following is a very brief review of just a few of the emerging investable technologies and trends we see in the coming decade:

- Shifts in transportation, alternative energy and autonomous vehicles;
- Medical advances to foster a healthy society;
- Entertainment;

- The continuing quest for immediate information, expanding beyond location and history;
- Robotics and automation.

Shifts in Transportation, Energy and Autonomous Driving:

Love them or hate them, our view is that the move toward hydrogen fuel cell and electric powered vehicles, ships and airplanes is gaining speed and market share gains will certainly follow, both globally and in the U.S. We see virtually all modes of shipping and transportation taking part in the advance of electrification and green hydrogen fuel cell power, as batteries improve and the cost of both batteries and the generation of green hydrogen from electrolysis come down.

Autonomous driving will be a reality sooner than many think. While we recognize it might be quite some time before typical drivers give up having control over their cars, it should be noted that cargo haulers are already experimenting with the idea, feeling that it would allow for more driving during “off peak” hours with marked improvements in safety. Cameras and sensors are vital in these efforts but even companies that do not immediately come to mind - such as insurance companies - should see some benefit.

Healthy Society:

Advances in healthcare are happening on multiple frontiers from innovation in diagnostic technologies such as liquid biopsy which helps to identify a patient’s cancer at an earlier stage, to novel medical devices that are helping today’s diabetics better manage their lives. Improvements through some of these technologies not only benefits the user (example a teenager with Type I diabetes) but also their parents who can now monitor their child’s health conditions through the connected care ecosystem. Advancements in healthcare-related wearables, VR, artificial organs, and mRNA therapies all show the uses of technology for the common good. The next decade will bring to light significant advances in surgical systems, precision surgical tools and newer surgical robots that will lead to more minimally invasive surgeries and better overall patient outcomes. The COVID-19 pandemic has brought to the forefront the real value in Telemedicine providing a very valuable link between physicians and patients. Post COVID, this new information medium will likely permanently change the delivery of healthcare.

Value Based Care models are replacing the traditional fee-for-service models in many areas. Newer medication risk management tools along with advances in analyzing a patient’s genomic profile will identify and prevent adverse drug events in many seniors taking multiple medications daily. Innovative scientists are bringing newer and more affordable technologies to remote geographies, as bulky expensive machines of the past are replaced by cheaper, mobile and efficient machines of the future. An example there would be bringing mobile MRI technology to patients and hospitals around the world.

Entertainment:

Tony Robbins once said, “We aren’t in an information age, we are in an entertainment age.” We concur with this view, for when you think about it, entertainment controls so many aspect of our lives. When the iPhone first came out many thought of it as “just a phone” but people soon realized it was far beyond

that. Sure, it made calls, but it also provided information and, thanks to developers, shortly excelled in entertainment to such a degree that it disrupted many areas that competed for our attention. Much of our entertainment is now in the form of virtual reality, eSports and online gaming. It's likely that in the near future entertainment and business will be augmented by holographics made possible by speedier and more responsive wireless networks. IoT in home and business will make us more productive and allow more time for entertainment.

Information:

Some of the most exciting areas of the future regarding information are in the areas of both B2B and what we might call E2C ("Education to Consumer"). Due to the pandemic a shift was witnessed in which employees were forced to work from home. An interesting result was that productivity did not seem to suffer and some corporations realized that they might be able save money by cutting back on office space (especially in higher-rent locations). Even when the pandemic is behind us it appears the work-from-home culture is here to stay. But it wasn't only workers that were affected. Students at all levels - at least, those who weren't doing so already - quickly had to adapt to online learning. Online exams, online classes and online collaboration and support in an educational setting shockingly disrupted the brick-and-mortar education system. In many instances, students were able to review lessons at their own individual pace rather than to sit in a room in which every student – no matter how fast or slow their level of understanding - moved at the same speed. As we have predicted in the past, we see the digital learning market achieving substantial growth in the years ahead.

Robotics and Automation:

There might be no area more disruptive than in robots and automation. While we already mentioned some of these (such as the self-driving vehicle) we dive a bit deeper than the obvious to envision what the world will look like years down the road. We recognize that employees seeking substantial raises in minimum wage may force the hand of owners who will then find it necessary to seek robotic replacements for workers, be it more kiosks (allowing clients to self-serve) or even robotic hamburger makers (such as are now being use in some restaurants in California). But robots are not being used simply to replace workers and we are exploring one interesting trend: companionship. It seems that loneliness and social isolation are quite prevalent among the elderly population. For many, dogs are impossible to take care of or not allowed (and someone to talk to might not be available 24 hours a day) so do robots (canine, feline or human) offer investment possibilities?

Over the coming months Emerald's investment team will be writing more detailed thought papers on these and other disruptive technologies giving current and prospective investors a glimpse into our predictions for the future and the wide range of potential investment opportunities available to profit from these emerging trends. We already see a great deal of innovation spawned at private, micro and small cap companies – areas of the investment market where Emerald has unique perspective and experience. The past three decades have been an exciting investment period, the next three will undoubtedly be filled with similar exciting and awe-inspiring advancements and disruptions. Buckle up with us and enjoy the ride.

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