Top 50 Emerging Technologies to Generate Multi-Billion Dollar Markets and Transform Our World

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In a web conference held in June 2020, entitled "Top 50 Emerging Technologies & Growth Opportunities," Vice President of Frost & Sullivan's TechVision, Anand S, presented TechVision's annual Top 50 Emerging Technologies research and delivered cutting-edge insights about some of the most prominent disruptive technologies poised to impact the world in the near future. The Top 50 technologies were selected from a pool of 3,000 using a proprietary methodology based on several criteria including industry adoption rates, IP activity, funding, and market potential and scored the highest on Frost & Sullivan's global technology innovation index.

As of today, virtually all companies across industries are going through a cycle of disruption, collapse, and transformation. Emerging technologies are enabling powerful innovations by converging with other advanced innovative solutions to generate multibillion-dollar markets and growth opportunities across our world. At the core, technology convergence involves overlaying two or more emerging or existing technologies to create unique value propositions that could be commercialized. While each emerging technology on its own represents an area of intensified R&D, heightened investments, increased IP activity, and tremendous market potential, the possible convergence of several technologies opens up unprecedented opportunities for new revenue models and the next generation of innovative products and solutions.

Latest Technology Trends and How They Give Rise to Futuristic Ideas

Mr. Anand outlined that, in 2011, the TechVision team launched a unique research initiative called the Top 50 Emerging Technologies & Convergence Opportunities, focusing on two primary fields. The first was to apply a specific methodology to an extensive base of technologies and innovations to the top 50 technologies that are likely to impact humanity in the near term significantly. The second objective was to look for possible technology convergence scenarios where two or more of the chosen Top 50 technologies and beyond are likely to create an innovative or disruptive market for new products, services, or solutions. The TechVision group is the technology IP, innovation and convergence focus, research, and consulting practice of Frost & Sullivan. TechVision organizes the universe of technologies into nine different technology clusters, such as Information and communications technology (ICT), sensors and instrumentation, chemicals, and advanced materials. TechVision believes that more than 90% of all technologies and innovations in the world can be mapped in these nine unique clusters giving us a comprehensive view of the entire technologies of the world.

Mr. Anand noted that these technology clusters cut across several verticals. The meaning of a technology developed in one cluster usually had applications
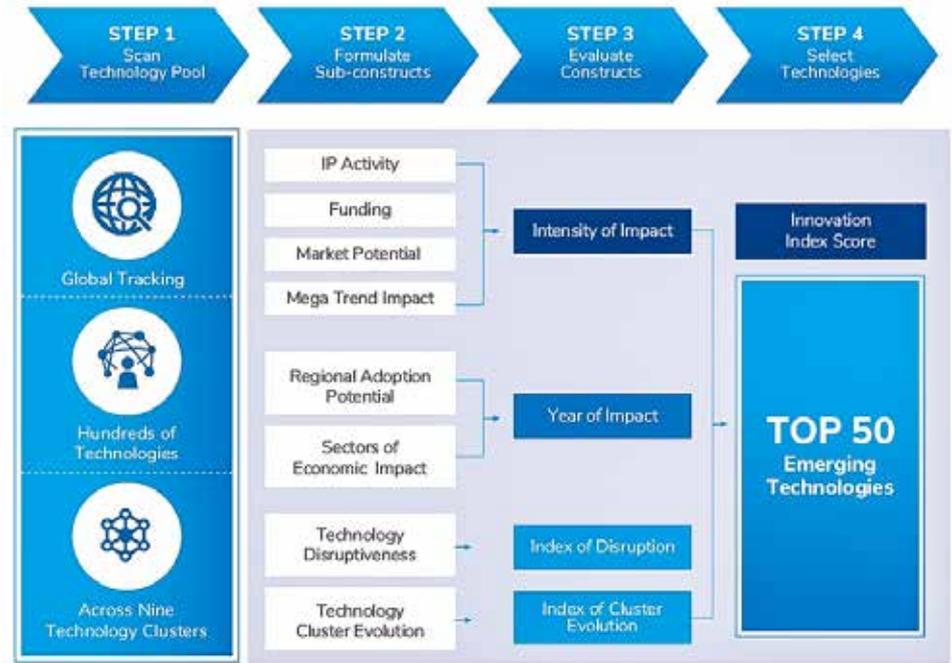
across several vertical industries. For instance, advanced material technology used in the automotive sector is also providing to the aerospace industry in packaging and infrastructure. Similarly, AI technologies have been horizontally applied to manufacturing, education, financial sector, and agriculture. There is no doubt that technologies have rapidly evolved in time, and the world has witnessed much dynamism in the global R&D landscape. The rate of innovation and launch of new technologies and ideas are getting faster and faster every year and every month for intriguing products and business models globally. Every organization, regardless of size or industry, is keenly focused on innovation. Mr. Anand underlined that we are living and craving in an era of "XTech." We can add the word "Tech" to pretty much any industry. For example, "FinTech" is a common word for the financial industry, EdTech, for the education industry, AgTech, for the agriculture industry, AdTech, for the advertisement industry. In other words, whether innovation is for products or services or business model or operations, it seems to be almost always driven by emerging technologies.

Technologies that Will Change the Direction and Landscape of Multiple Industries

According to Mr. Anand, we live in a fascinating world at a very intriguing time of our life, and it is going to get a lot more exciting in the coming years. Referring to the fast-changing innovation-driven

STRATEGIC APPROACH

A proprietary selection methodology focused on evaluating innovations across nine technology clusters.

future world, He emphasized that all the new business models have been only possible after three things; deep penetration of global Internet connectivity, the speed at which data can be transmitted today by fiber optics as well as wirelessly and wide-scale adoption of handheld, personalized devices. These business models are driving new growth opportunities that will shape the industries and the markets.

For instance, the drones are, of course, no longer the strategic weapons of war. They are being utilized for all sorts of peaceful activities such as monitoring, farming, photography, gaming, weather mapping, and other practical applications and soon enough for delivery and logistics business models for all sorts of packages, food, medicine, clean water, and so on so forth. The Wing, Alphabet-owned startup, is the first company to secure FAA approval of flying their

drones for the delivery of commercial items up to 1.5 kilograms, Amazon is developing a similar approach with up to five pounds of delivery weight. Wing has done thousands of experiments, and they are starting to deliver in Australia, Finland later this year and soon in the US.

Similarly, autonomous cars are perhaps the most exciting and most talked field of innovation. According to TechVision, in April of 2015, only three car companies had the approval to test self-driving cars in the state of California. As of the first of January 2019, that number has mushroomed to 62 and of the 62 permit holders; there are only about 15 or so companies that are traditional automotive makers, the remaining are all sorts of electronics, AI and software companies such as Samsung, Intel, Apple, Google, and Dyson. This is a clear sign of things to come. Autonomous driving

technology opens a whole new potential for a range of disruptions in the design and manufacturing in sales and marketing of such cars. Frost & Sullivan predict that over 500,000 autonomous cars are likely to be added every year globally by 2025, and one in every four vehicles will be self-driving by the year 2030. There are several other examples of disruptive innovations like AI and Machine Learning based Data Analytics as a service model. Augmented and VR (Virtual Reality) combinations of various applications and several other examples of collaborative business models like Uber and Airbnb promote pay-for-use vs. pay-for-possession type of circular economy business models.

Another example is Augmented Analytics technology, which can be summarized as Business Intelligence meeting Artificial Intelligence.

The enterprises need to incorporate data analytics into their daily processes to streamline operations and reduce operating costs. More importantly, they need to use advanced analytics to maximize business agility and remain competitive in a dynamic business environment. Generating data insights on its own without intervention by a team of data scientists, and expensive IT infrastructure is a significant concern today. Despite substantial investment in Big Data analytics and machine learning and cognitive computing, businesses are still struggling with some critical problems, such as having too much data volume and very little insight. There is an inefficient connection between insight and discovery and actual business decisions and actions taken based on those insights. Augmented analytics enable systems to learn more, adapt very quickly, and improve their performance. It leverages machine learning in any AI platform and transforms business processes by connecting and interlinking diverse data sources, processing, and analyzing the gathered data and then building data-rich applications.

Impacts of Disruptive Technologies on Businesses that Pursues Convergence Strategies

Companies involved in businesses are seeing a steady flow of investments, especially for marketing and geographic expansion. TechVision estimates that close to US$4billion were invested in areas of computer vision, machine learning, and advanced analytics just last year, and nearly 20,000 patents were published in this area in the previous three years. Enterprises can use augmented analytics to rapidly transform and streamline their operations by deploying self-learning and self-assuring business processes in various industry sectors. Frost & Sullivan considers that augmented analytics offer a tremendous range of opportunities where minute analytics could be applied to solve existing business challenges.

Frost & Sullivan indicates some very promising signals from the universe of 50 technologies. According to the TechVision group, these technologies' total market potential is nearly US$3 trillion over the next five years. Between US$100-120 billion were invested in R&D of these technologies in the last two years, and there are over 275,000 patents granted in these areas in the past three years. Each technology area has its own ecosystem or network of scientists and developers and funding sources, aid organizations, and patent holders. There are incredible, groundbreaking developments taking place in each area, and that is very valuable. However, Mr. Anand believes that the whitespace in between these technologies is even more powerful, with a lot of collaboration and convergence happening or could potentially happening. Random but practical combinations of multiple technologies to create a valuable solution will be a significant game-changer trend in the future.

Conclusion

TechVision deems that what new solutions can be created by combining different technologies is the more exciting part of this research. While each of the top 50 technologies represents an area of intensified research & development, top-tier investments, and tremendous market potential, the possible convergence of several of these technologies opens up unprecedented opportunities for new revenue models and the next generation of innovative products and solutions. Most importantly, it depends on specific industries and applications as well as innovative and collaborative minds to create something unique and valuable. By taking advantage of this perspective and making extraordinary growth partnerships and leveraging the point of convergence, organizations with multiple sub-studies might find several potential collaboration partners willing to leverage the same aspects of convergence and waves of innovation to co-create an exciting future ∎