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Seven Laws of Zero Will Reshape the Future. How Will Insurers Respond?

"There are decades where nothing happens and there are weeks where decades happen," observed Vladimir Lenin. The arduous weeks spent grappling with the COVID-19 pandemic certainly fall into the weeks-where-decades-happen category.

Take telehealth for example; its adoption has seemingly been on the horizon for decades and suddenly, within weeks after COVID-19 became a pandemic, achieved near universal embrace. McKinsey & Company estimated that healthcare providers saw 50 to 175 times more patients via telehealth in the months after the pandemic than ever before. Additionally, 57% of providers viewed telehealth more favorably than before the pandemic, and 64% of providers reported that they felt more comfortable using telehealth. Now, even as the pandemic recedes, another McKinsey survey found that 40% of consumers believe they will continue to use telehealth at similar or greater levels even after the pandemic ends. These punctuated changes in preference, perception, and practice will force the rewiring of the entire healthcare delivery system.

Similarly, insurance has steadily, but unevenly, digitized for decades. Suddenly (and admirably), within weeks after COVID-19, the digital nature of most insurers' work, collaboration, transaction, and customer service greatly accelerated. Still, insurance carriers have not risen to the challenge equally. A recent PwC survey found that customers are not suffering laggards lightly. Of customers who expressed difficulties in dealing with their carriers, 41% said they are likely to switch providers due to inadequate digital capabilities.

A key aspect of successful innovation in the context of such rapid change is to first deeply understand the technological drivers behind that change. I briefly introduced these drivers in my first article of this series, titled *How Insurers Can Change the World*, as the Laws of Zero. In this article, I explore these laws in more detail to highlight the changing future context in which insurers must operate.

The basic ideas behind the Laws of Zero are that seven key drivers of change—computing, communications, information, genomics, energy, water, and transportation—are improving exponentially in capability while headed toward a nearly zero relative cost. This yields two critical implications. First, as shown in the figure below, there exists a rapidly expanding gap between state-of-the-art technology potential and incremental change. Secondly, rapidly decreasing cost of those state-of-the-art capabilities will drive marketplace adoption; we can plan on being able to utilize as much of these capabilities as we need to smartly address any problem.

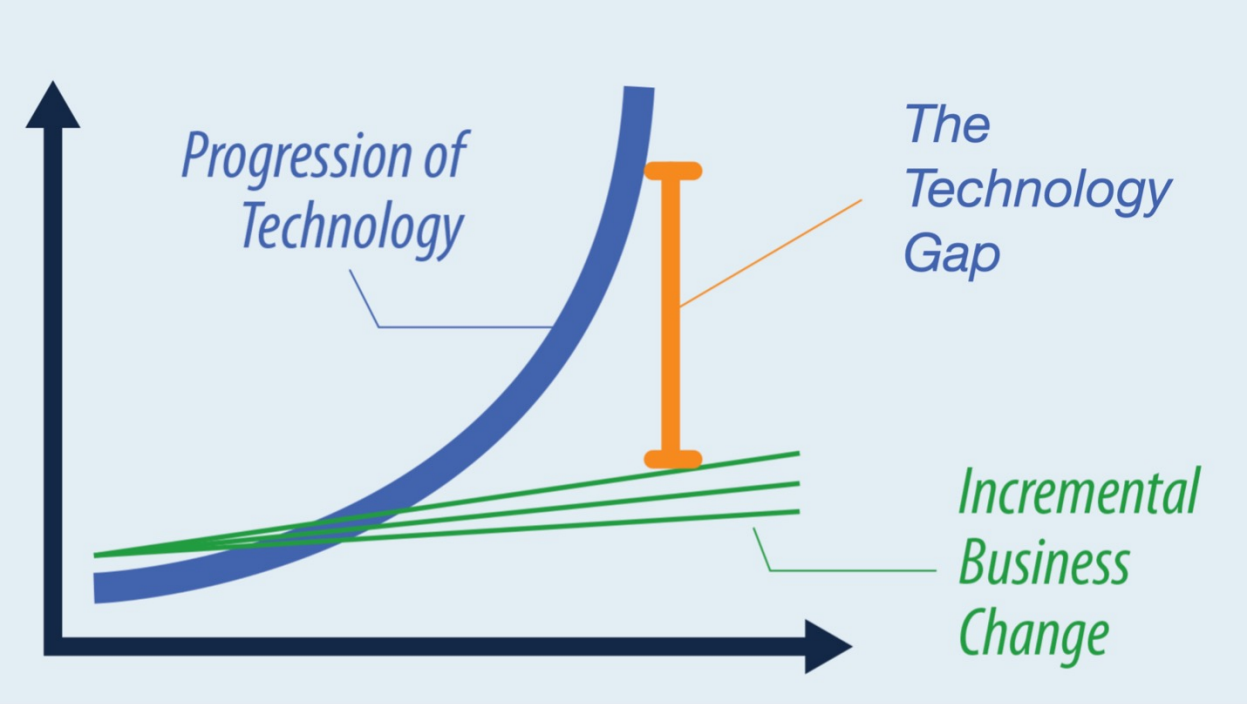

Figure 1: The Rapidly Expanding Technology Gap

Successful innovation requires anticipating future scenarios, both upside and downside, enabled by the Laws of Zero, and then smartly pulling backwards to the present to chart possible paths for working towards the opportunities while managing downside risks. The best way to predict the future, as Alan Kay says, is to invent it.

Now, let's explore the drivers and lay the foundation for understanding the upside and downside scenarios that should drive your innovation agenda.

1. Computing

The smartphone in your pocket has over 100,000 times more processing power and 1,000,000 million times more memory than the computer that guided Apollo 11 to the moon and back—at a percentage of cost that effectively rounds to zero. While computing power obviously isn't free (as anyone buying a smartphone knows), that power looks almost free from any historical distance.

Now, consider how computing capabilities will change over the next several decades. If Moore's Law remains an accurate guide, computing power will double by a factor of 20 in the next 30 years while cost would be cut in half 20 times. In other words, we can look forward to analytical power more than one million times faster than the present with a per unit cost of today's divided by one million. What's more, trillions of devices will be connected in a network, making the so-called *Internet of Things* millions of times more important than it already is.

Building on ever-smaller connected devices, over the next several years AI-driven voice input assistants such as Alexa, Google Home, and Siri, will not only take commands, but will act as

sensors that can detect illness, provide home security, etc. Robots will extend our presence: just slap on some virtual reality goggles and (with permission) “inhabit” a robot in your kid’s, parent’s, or friend’s room. Computing could be implanted in our bodies. A chip right below the jaw and near the ear could capture our voices while vibrating in ways that our ears would easily pick up as sound. There is even talk of chip implants that would plug directly into our brains and give us instant access to essentially all the world’s information. People may turn into a form of centaur, except that, instead of being half-human and half-horse, we would be part people, part electronics.

People, homes, cars, and all other things being insured and served will never be the same, and the insurers who serve these assets must adapt as well.

2. Communications

Communications will reach into every corner of the globe, as tens-of-billions of devices and trillions of sensors are incorporated into a tapestry of communication. In other words, we aren’t just talking about humans connecting with each other. We’re also talking about humans talking to devices as well as devices talking to each other. This communication could happen anywhere because, with a little solar power and a tiny antenna, every device could be connected.

Communication will become richer too, as having bandwidth to burn means that video can be part of every connection. Think of how easily the world moved from voice calls to Zoom calls during the pandemic. Now imagine having thousands of times as much bandwidth available. If you draw the graph of cost vs. performance from today’s perspective, that cost will be so low that universal ultra-high bandwidth connectivity will be the normal expectation rather than an exception.

Imagine what that will mean for every aspect of the insurance value chain, including underwriting, distribution, claims, and service.

3. Information

The ability to embed computing and communications into every aspect of life will exponentially expand the amount of information available. Paired with rapidly improving data analytics, machine learning, and other artificial intelligence capabilities, information will enable more powerful knowledge-driven enterprises.

Think about a situation we’re all familiar with, the daily commute. Every car and street will soon be so thoroughly wired that traffic will be managed in ways that aren’t conceivable today. For example, just because you can’t see what might be coming at you from the sides at an intersection, doesn’t mean another car can’t see for you and relay that information to your car; a camera mounted on a car, for instance, could spot a vehicle zooming through a red light and automatically alert all cars in the vicinity to halt and wait for the danger to clear the intersection. The presence of ice or any other danger will be immediately communicated to all cars in the area. Traffic will be managed as a single, highly efficient digital system, rather than through a few rules that require hundreds of millions of drivers to sort things out on their own.

Ubiquitous sensors will supply information from everywhere else, too - - including our bodies. Already, sensors built into contact lenses can measure blood sugar levels. A cuff about the size of a smartwatch can report on blood pressure in real time. Tiny cameras can now be sealed into a capsule the size of a cod liver oil tablet that someone can swallow; these cameras screen for

cancer as they pass through the person's bowel, meaning the person can avoid the dreaded colonoscopy. In addition, chips the size of a grain of salt are being developed that could be swallowed and provide real-time data on our vital signs from inside our bloodstreams - - sort of an *Internet of Me* to go along with the Internet of Things.

Yes, this sort of transparency could be a scary prospect and the concept of Big Brother is a real possibility. Breaches in cyber security will be an ever-present threat. How do insurers shape their futures in a world where every bit of information is available? How do these insurers offer trustworthy products and service while navigating potential problems?

4. Genomics

If DNA is "the language in which God created life," as President Bill Clinton once put it, then genomics' acceleration has brought us to the point where we can read and write in the language of life. It cost billions of research dollars to sequence the first human genome in 2003. Today, sequencing a genome costs roughly $600. That's a cost improvement of more than one million times. That's almost seven orders of magnitude in just 18 years. There are already attachments that let you sequence a genome from an app on your own smartphone. Likewise, rapid improvements are being made in the field of gene editing, building on revolutionary techniques such as CRISPR/Cas9 (called CRISPR for short) and mRNA.

In medicine, as Craig Venter the genomics pioneer has observed, almost every new drug and vaccine is already based on genomics, and, even at our early stage of knowledge, genomics provides hope for addressing several diseases caused by variation in a single gene. These diseases, known as monogenic disorders, include sickle cell anemia, cystic fibrosis, Huntington's disease, and Duchenne muscular dystrophy – debilitating diseases that afflict some 400,000 people in the U.S. CRISPR is helping researchers better understand these diseases, and a number of therapies are in clinical trials for treating and even curing them; however, the cost of such therapies might be crushing.

The combination of massive power and plunging costs guarantee that we will soon be able to sequence any genome, anytime, anywhere, with profound implications not just for medicine but far beyond. Genomics is a foundational tool in almost every field of science related to biology, including agriculture, environmental studies, health, and zoology. Genomics will exponentially amplify science and engineering's impact over the next half century to a degree that will likely surpass the impact of the computing platform it is built upon.

We still have much to learn to become truly fluent in the language of life. It is not hard to envision, however, harnessing the power of genomics to create healthier foods; to eliminate the microbes that cause disease; to eradicate the most dangerous pests; to identify and possibly correct the genetic markers that cause disease; and to do all of the former in an ethical and equitable manner with a deep understanding of the implications of our choices.

The opportunities and challenges for life and health insurance will be profound.

5. Energy

When Bell Labs developed the first solar photovoltaic panel in 1954, the cost was $1,000 per watt produced. That meant it cost $75,000 to power a single reading lamp, which is a little pricey. By 2017, solar was down to $0.25 a watt. A solar project that will supply 7% of the electricity to Los Angeles promises power at less than $0.02 per kilowatt hour (kwh), while the

national average for electricity charges to consumers in the U.S. is nearly seven times that. The International Energy Agency's annual report for 2020 says solar power is already "the cheapest electricity in history." A drop in price by a factor of 3,000 over six decades isn't Moore's law, but it's certainly headed toward that magic number: zero.

Wind power is also on an aggressive move toward zero as prices are down nearly 50% in the past year. Contracts were recently signed for wind power in Brazil at a cost of 1.75 cents per kilowatt hour, about one-fourth the average of 6.8 cents per kwh worldwide for coal, considered to be the cheapest of the conventional energy sources.

The key holdup for renewable energy has been batteries. There must be some way to store the solar and wind energy for when you need it, which means the need for lots of battery capacity. Fortunately, batteries are progressing on three key fronts: battery life, power, and cost. CATL, the world's top battery producer, recently announced a car battery that can operate for 1.2 million miles, eight times longer than most car batteries on the market today. Additionally, battery prices have plunged 87% in the past 10 years.

So, we have at least three cost curves that look like they're headed toward zero: solar, wind, and batteries. That's plenty, but others are worth mentioning as well, including nuclear fission, nuclear fusion, geothermal, and radical improvements in efficiency. Together, these curves create a Law of Zero for clean energy that will create unfathomable benefits.

Energy drives every living thing and unlimited clean energy will drive unlimited opportunities.

6. Water

A quarter of humanity faces looming water crises, and demand is growing along with population, urbanization and wealth, and the taxing of traditional fresh water supplies while also polluting them. But there's hope – limitless energy could allow for the almost magical availability of water.

By 2050, anyone near a body of saltwater could benefit from water technology breakthroughs. Desalination has always been possible, but prohibitively expensive because of energy costs, whether done by filtering out the salt through osmosis or by evaporating the water and leaving the salt behind. Cheap energy makes desalination more plausible, hopefully in time for the many cities around the world that are getting desperate for water.

Water won't be pulled out of thin air in great quantities anytime soon, but that technology is also under development. One group won a $1.5 million X Prize by developing a generator that can be used in any climate to extract at least 2,000 liters of water a day from the air at a cost of less than $0.02 per liter, using entirely renewable energy. One can imagine a day when decentralized production of water will lead to benefits akin to those that come from having abundant electricity while off the grid.

Where there is abundant water, along with the energy that comes from the Law of Zero, there can be food. The basics of life will be available everywhere, even at the far corners of the Earth.

7. Transportation

Although the enthusiasm for autonomous vehicles (AVs) took a hit for a couple of years – they are a really hard problem – momentum is building again, and the multitude of startups and brilliant scientists tackling the issues portends a future that will include an unlimited number of fully AVs.

The implications are mind-boggling. AVs are aimed at dramatically improving two key drawbacks of human-driven cars. First, humans are bad drivers. More than 90% of vehicular accidents are due to human error, which result in tens of thousands of deaths, millions of injuries, and hundreds of billions in cost each year—just in the United States. Worldwide, the figures are much more staggering. Bad driving also leads to traffic congestion, costing hundreds of billions of dollars due to added hours in traffic, wasted gasoline, and lost productivity. Secondly, human-driven cars are very underutilized. Most of these cars are personally owned and sit parked and unused more than 95% of the time. Some estimate that AVs, once successfully deployed as fleets of shared Uber-like on-demand vehicles, could reduce accidents, lower congestion, and reduce the number of cars by 90%.

Now, a lot of metal will need to be shaped and maintained even in an autonomous future, so transportation won't be free. But that transportation will be so much less expensive than it is today that we can be profligate in throwing transportation resources at anything we want to. Think in terms of a world where fuel is free and, thus, infinite, where many considerations of time and distance no longer matter. Think about how health, wealth, education, economic mobility, and more could all improve because access to transportation currently constrains so many people.

Yes, lots of people and businesses will have to adapt. Among the notable are the 4.5 million professional drivers in the U.S. AVs will also change emergency rooms, which currently treat some 2.5 million people each year after auto accidents and, based on current estimates, might treat only 10% as many individuals once AVs become ubiquitous. Car dealers, gas stations, oil companies, auto repair shops, and most others in the multi-trillion-dollar transportation value chain might well be disrupted.

There's also the existential question for auto insurers: why do you need personal auto insurance when there are almost no accidents, and you aren't driving anyway? Will personal car insurance essentially go away?

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Not all the Laws of Zero will kick in right away. The ubiquity of water in particular, will take time to play out, partly because getting to zero cost for energy will also take time. Other laws, such as information and genomics, are driving disruption faster than most imagine.

Here's the core question all insurers should explore: how will these Laws of Zero shape the future? As customers, supply chain partners, competitors, and others in the world at large accelerate their own digitization, driven by the Laws of Zero, how will insurers innovatively adapt their own business and operating models to stay responsive and competitive? Insurers should assume that decades will continue to happen in the weeks and months ahead.

These are times that demand both giant leaps and baby steps. In upcoming articles and webinars, we will continue to explore how insurers can systematically do both. In the meantime, we welcome your comments and questions.

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About the Author:
Chunka Mui is a futurist and innovation advisor who helps organizations design and stress test innovation strategies. He is the best-selling author of four books on strategy and innovation including *The New Killer Apps: How Large Companies Can Out-Innovate Start-Ups* and *Billion Dollar Lessons: What You Can Learn From the Most Inexcusable Business Failures of the Last 25 Years*. Chunka is also a regular contributor to *Forbes*. Chunka was previously managing partner and chief innovation officer of Diamond Management and Technology Consultants (now part of PWC) and co-founder and director of Vanguard. Chunka holds a B.S. in computer science and engineering from MIT.