

November 2019 @ CTM

THE DIRECTOR SPEAKS - To 5G and Beyond!



As expected, 5G was the buzz at the Mobile World Congress this month. Many were talking about how 5G would change the gaming industry, drive further disruption to entertainment, and enable the nascent internet of things market. 5G's ability to provide high bandwidth and low delay digital services wireless to people wherever they are and whenever they want, frees us from the wired tethers that had been required for high performance digital entertainment and business support services. A quick scan of a couple of websites shows eight 5G cellphones are already in the market but sales of these units has been slow as the early 5G networks begin to expand. BayStreet research is estimating a total of 29K 5G cellphones will have been sold at the end of 2019. ATT is reporting that they have made some initial deployment of 5G in 21 cities so far, Verizon is reporting 5G in 15 cities, and Sprint is in six cities. (T-Mobile is planning to launch their initial 5G service later in 2019). Comparison between these plans is problematic because the service providers are using different implementation plans making an apples-to-apples comparison almost impossible. In fact, CTIA and the FCC are both working to derive an industry

accepted definition of 5G consumer performance so that comparative coverage maps can be drawn – something that cannot be done today (there is a technical standard for 5G that defines how 5G systems work but it does not specify consumer performance expectations).

Moreover 5G service can be provided in low-band (below 1Ghz), mid-band(3.5Ghz), and millimeter band spectrum (26/28GHz). The millimeter band spectrum provides for higher service speeds but coverage is limited so it requires more cell sites. In contrast, the low-band spectrum is slower but covers greater distances. Ultimately, service providers want to provide service in multiple bands so they can support customers that roam between service dense geographies, where there is high demand, and areas where demand for service is lower. The math behind any shared service like 5G is that the available spectrum is shared by the individuals covered by a cell site.

Additionally, current 5G networks are categorized as being non-standalone networks, in that the underlying network is based on traditional LTE network architectures. These networks support consumer 5G performance experiences but as service demand increases, the LTE network architecture will begin to exhaust. In contrast, in 2020 a new 5G network architecture will become available, which has been designed to provide more network efficiency. But it will require an adaption of the underlying network architecture. This transformation should be relatively transparent to the end-user, but it will allow service providers to reduce costs once they have gone through the pain of the network upgrade.

If we look back at history, each cellular step forward, from 1G-to-2G, 2G-to-3G, 3G-to-4G, has significantly changed the way we live our lives and conduct business. Roughly speaking, each of these cycles has taken 8 to 10 years to go from initial deployment to a point where the benefits are provided across the mass market. Our expectation should be that the transition to 5G will follow a similar path. However, since the market benefit and complexity of these networks is even more pronounced, maybe we should be expecting the window needed to reach mass market penetration rates will be even longer.

UPCOMING EVENTS

- **Nov 1, 2019.** [Hack SC](#) Applications Open. Social Justice Hackathon Event held Jan 31 - Feb 2, 2020
- **Nov 7-8, 2019.** [Wonder Women Tech, Long Beach Convention Center](#), Long Beach CA
- **Nov 18, 2019.** [Securing Mobility Summit](#), Los Angeles Convention Center, Los Angeles CA
- **Nov 18-21, 2019.** [Automobility LA](#), Los Angeles Convention Center, Los Angeles CA
- **Nov 20, 2019,** I3 teleconferences covering I3 business issues, I3 technical issues, and I3 based parking.
- **Nov 22 -Dec 1, 2019,** [Los Angeles Auto Show](#), Los Angeles Convention Center, Los Angeles CA
- **Dec 13, 2019,** [3rd SoCalBio Digital Health Conference: It Is All About The Analytics](#), Santa Monica, CA
- **Dec 19, 2019.** [I3 Face-to-Face Meeting](#), USC Downtown Building, Los Angeles CA.
- **Jan 21, 2020.** [I3 Workshop/Conference](#), USC Doheney Library, USC Campus, Los Angeles CA

If you have an event that you would like us to include in our newsletter, please send an email to manager@i3-iot.net

IN CONVERSATION WITH Shelby Phillips, Hyperloop

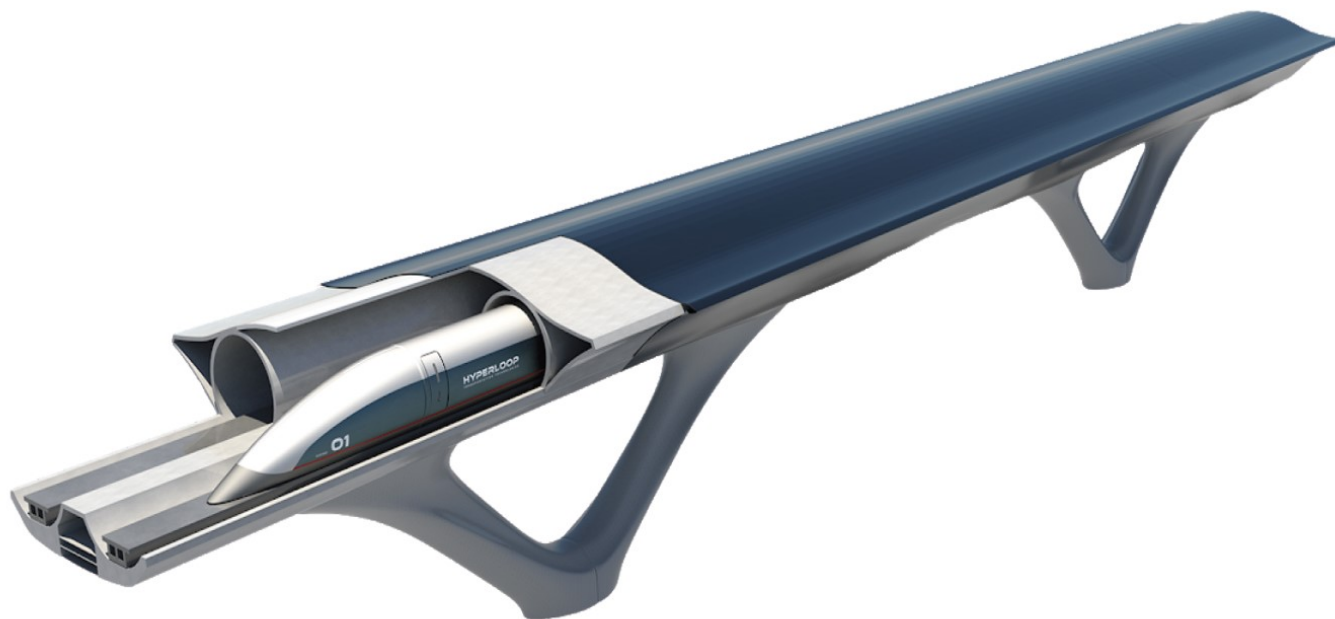


Shelby Phillip is the Head of Executive Staff and US Public Affairs for Hyperloop Transportation Technologies. The Hyperloop is a revolutionary form of transportation that will transport humans and goods in capsules at close to supersonic speeds. The Hyperloop utilizes a combination of renewable energies like solar, wind, kinetic, regenerative braking and geo-thermal, producing more electricity than it consumes. Compared to other modes of transportation, it is the fastest, safest, and most environmentally friendly mode of transport.

What is hyperloop?

I believe hyperloop is an innovation that is changing the world. It has the ability to move people and goods at unprecedented speeds. It has the power to impact global warming for the better. It has the opportunity to disrupt the status quo. It is a transformational new form of transport.

By definition, a hyperloop is a tube-based inter and intra-city transportation system that moves people and goods at airplane speeds safely, efficiently, and sustainably, on the ground. Passenger and cargo capsules levitate inside a tube using next-generation electromagnetic technology and a linear electric motor for propulsion. By creating a low-pressure environment inside the tube using vacuum technology, friction is considerably reduced allowing for not only faster speeds, but a safer, cleaner and quieter form of energy-efficient transport. Further, the enclosed system eliminates environmental factors and obstacles along development corridors by removing interaction from weather, road and rail traffic, pedestrians, and wildlife. Renewable energy provides power to the system, which is designed to be net-energy positive over a year of operation. Plus the system operates autonomously, which increases safety, reduces operating costs, and creates a more profitable mobility solution.



This has the potential to change the way we live and work, with commuting between metropolitan areas no longer being a barrier to economic independence. This fifth mode of transportation provides solutions for affordable housing and job commuting while enhancing personal lives in an energy independent and environmentally sustainable manner.

What makes Hyperloop Transportation Technologies (HyperloopTT) different from a traditional startup?

HyperloopTT has a unique business model. We began crowdsourced. In order to accomplish something of this magnitude, we needed to create more than just a transportation system, we needed to create a movement around the world -- a movement of people all committed and passionate about bringing the hyperloop to life.

Today we have more than 800 contributors all over the world working to make hyperloop a reality. Many are engineers, scientists, researchers, experts in a variety of fields, who have become stakeholders in the company by earning stock options for the hours they can give. As I said, our model is unique and we think it has the potential to go far beyond us. This model is the future of work and in fact, Harvard Business School conducted a case study on us and agrees. Their study defines how to make pioneering breakthroughs with the power of the crowd. The idea of a crowd-powered ecosystem can be implemented in any industry, for any project, and we believe, can lead to more significant innovations around the world.

As employee #4 at HyperloopTT, you have had a front row seat in watching the endeavor evolve. Can you describe the evolutionary path hyperloop has taken?

In 2013, in answer to the California High Speed Rail initiative, Elon Musk wrote a white paper entitled Hyperloop Alpha. In it he re-introduced the world to tube travel. Tube travel is not a new idea, it's just an idea whose time has finally come. We have the power to induce and sustain a vacuum environment; we have the technology to levitate large capsules; we have the expertise in building tunnels, pipelines and pylons; and now we have the knowhow to integrate all these existing systems together.

When I started as a contributor in 2015, people would say things like, "Yeah, if this thing happens" or "If this thing really works." Now, in 2019, the word IF has been replaced with WHEN -- when this thing happens -- and it is happening! There are multiple companies in the hyperloop space, numerous pre-feasibility studies, there is even a nonprofit association. We've got ourselves an industry!

After Elon wrote the white paper, he made it open-source. I credit our founder, Dirk Ahlborn with having the vision that it would take a movement to bring hyperloop to life, knowing that one man, one company would not succeed. Dirk had the courage to answer the call and assemble a crowd through his JumpStartFund technology incubator. To paraphrase Derek Sivers, it takes the first follower to transform the lone nut and create a movement.

Bringing new technology to market is always challenging because customers often do not have a basis for comparison. How have you addressed these challenges?

With any evolution there are going to be the hand raisers, the naysayers and the show-me's. HyperloopTT is the original hyperloop company and has been dedicated to this movement for over 6 years. During that time we have formed successful strategic partnerships; educated countless people in both the public and private sectors, and built a full-scale testing facility in Toulouse, France along with the first-ever passenger hyperloop capsule. We have created the first generic guidelines for hyperloop safety and certification, and we've even developed a hyperloop system that has been deemed feasible and insurable by the largest reinsurance company in the world.

We have been working closely with the new Non-traditional and Emerging Transportation Technologies (NETT) Council, which was recently assembled at the US Department of Transportation, so that we can collaborate on regulatory issues. We have also been busy perfecting strategies to mitigate right of way and land use issues. I believe the idea of tube travel is feasible, and not decades away but just years.

In fact, in December of this year, I am proud to announce that we will be releasing the results of our Great Lakes Hyperloop Feasibility Study (GLHFS). This project has studied routes between Chicago, IL, Cleveland, OH, and Pittsburgh, PA, making it the first multi-state, mega-region hyperloop only feasibility study in the US. The GLHFS results show positive financial and cost benefit outcomes producing a strong case for developing the corridor with HyperloopTT passenger and freight systems. These performance and economic results confirm the transformative nature of hyperloop and will soon energize a transport revolution not seen in over 100 years. And for that, I am so very proud to be apart of this team.

THOUGHTS FROM STEVE SHEPARD: What is so Smart about being "Smart"



I'm growing weary of 'smart.' Smart cities, smart universities, smart hospitals, smart farms...you get the picture. I grow weary because when I gently push back and ask what the person means by 'smart,' I usually hear what has become an all-too-typical starry-eyed response that goes something like this:

How amazing it is! When a person is walking downtown at night, the streetlights stay dark until the person walks under them, at which point they come on and then turn off as they leave one and head on to the next!

While I think that's a nice thing, it doesn't impress me as being particularly smart. Grocery store doors have been opening automatically when customers approach since 1965 or so. This isn't much more impressive than that. But you know what would be impressive, what would make me see the 'smart' in a smart city? Here's what I'd like to see - I would like to see enough data

around these activities that the city can forecast needs and proactively prepare for future needs. How often did that light come on? What time of night did it happen? How often? How long did it stay on? Did any other lights come on? What was the weather like when it was going on and off? Was there any crime going on in the area at the time? Are there any cameras accessible to law enforcement that might have captured illegal activities that triggered the light? And, I should add, that I would like to see more than just the data, as a citizen I would want to understand the algorithms that being applied to the data to make the cities function better.

It's the context and the algorithmically driven processes, not the act that makes a city smart. My concern is that we often get so captivated by what we're capable of doing technologically, we forget that it's the application in a social context that makes the difference. Leaders in the technology space, take heed: Without context, technology and the data it produces is nothing more than an interesting curiosity.

THE I³ CORNER (I3.usc.edu)

The I3 Consortium is in the process of updating its web site (I3.usc.edu). As a part of this process we have simplified the process (and the requirements) for joining the I3 consortium. We have also produced three videos that will be posted to the web site shortly. In advance of their posting, our readers can view the videos via the following links: [I3: The need for IOT](#), [I3: What is I3?](#), and [I3: A Demonstration](#).

We continue to move forward toward a public release of the I3 opensource software around the end of the year. In celebration of this milestone, we are in the process of planning our next I3 conference/workshop for Jan 21, 2020.

At prior I3 meetings the Consortium has discussed the possibility using the Consortium to as a tool that might help the I3 Member Companies fill open positions in the field of IOT and data analytics. While there are a number of general purpose job sites, they are targeted at the mass market whereas the I3 and CTM community represent a rather unique group of out-of-the-box thinkers who are working hard to make a difference for their company and community through the application of technology and data in breakthrough fashion. As an experiment, and to test the viability of a tool that is more targeted toward our 6500 plus readers, if you are interested, please feel free to send a two or three sentence description of any open positions at your company and we will post them as a part of our newsletter. If we can help the I3 and CTM member communities to those looking for new and exciting opportunities, that is a win-win solution for everyone. Just email me the position description at manager@i3-iot.net.

READER CONTRIBUTION: Transforming Healthcare with Big Data and AI by Mingbo Gong

No one can talk about the development of human civilization without diving deep into the advancement of healthcare and medicine. Looking back at how today's healthcare system is shaped, there are many indispensable milestones. The practice of medicine began when Hippocrates of Kos started the first school of medicine, which established the medical profession and created the first document on the ethics of this profession. Galen of Pergamon was the first to apply anatomy to medicine, which influenced the development of anatomy and various healthcare fields.

The ten centuries between the fifth and the fifteenth century saw limited development in medicine and healthcare, and this period was filled with infectious and epidemic diseases. The development of healthcare and medicine finally saw the light, as Andreas Vesalius founded modern human anatomy in the sixteenth century. The next two centuries witnessed the discovery of microorganisms and the invention of the world's first vaccine in the eighteenth century.

With industrialization came an evolution of medicine and healthcare in the nineteenth century. Medical devices and technologies, such as x-rays, stethoscopes, sphygmomanometers, and thermometers were invented. Charles Darwin introduced the theory of evolution; Theodor Schwann extended cell theories; Florence Nightingale established the practice of nursing. Healthcare development did not slow down in the twentieth century with the world's first antibiotic substance, medical imageology, and molecular biology.

In the twenty-first century, more countries are considering healthcare as their top priority, computing and data storage capacities are increasing substantially, and more multi-disciplinary talents are coming into the healthcare industry. It is evident that the momentum of healthcare evolution will continue through the twenty-first century. I believe that the first two decades of the century will mark a new milestone in the history of healthcare, driven by the rapid development of health data and advanced data applications in healthcare.

How can we leverage data science and advanced data tools to advance the quality of our healthcare systems? An upcoming book from Information Age Publishing, "[Transforming Healthcare with Big Data and AI](#)" will explore the critical topics at the intersection of

data technologies and healthcare, with use cases and real-world examples that demonstrate how data science, artificial intelligence, IoT technologies, and blockchain are transforming healthcare.

This book is the fruit of a digital healthcare conference called Transforming Healthcare with Data, which took place on November 3, 2017, at the University of Southern California. Hosted by Mingbo Gong, Dr. Anna Farzinar, and Dr. Alex Liu, the conference invited 30 speakers and brought together over 300 healthcare practitioners, data technologists, civic leaders, researchers, and students. The conference was organized into three sessions: health data technologies, healthcare research, and digital health startups.

The health data technologies sessions covered many of today's relevant topics in digital healthcare. It is clear that recent advances in technology are coming together in such a way as to allow another huge leap forward that will impact research and the practice of medicine. Many of the speakers at that conference collectively decided to participate in the creation of this book so the messages from the conference are shared with a larger, global audience. The authors make this book unique, as they come from multidisciplinary expertise as data scientists, healthcare experts, university professors, and entrepreneurs with a common belief that technology, when applied with skill and expertise, can achieve great things that benefit the doctor, the healthcare industry, and society as a whole.

READINGS FROM THE EDITOR'S DESK

- [The Future of Identity: Digital Marketing Trends that go Beyond 2020](#). Identity resolution is a process that combines multiple data sets to understand customer behaviors across different devices or activities. Combining data sets can be tricky today but will be even more difficult once IOT based data sets are added to the process.
- [The Storied State of Economics](#). Even in the field of economics, storytelling that focuses on either fear or triumphs often win the day over reason and statistics. Behaviorists will confirm that sound logic often loses to aspirational drivers and historic experiences.
- [Why Security is Job #1 in a Zero-Trust World](#). Castle and moat data security concepts assume the bad guys can be kept out and that capex spending provides the best defense. I do not like the term zero-trust but the point is that process and education are the critical components for data security.
- [Agile Management: Moving Fast but not Breaking Things](#). Agile does not mean there is no plan, it means plans are allowed to adapt. Agile does not mean everything is ad hoc, it makes communications and governance essential. Agile processes does not eliminate responsibility but increases responsibilities.
- [A Generational Shift Is Occurring In Data Management](#). The world of data infrastructure is about to go through a generational shift as companies accept the importance of real-time access to data and begin to treat data infrastructure as a strategic asset rather than as a support vehicle.
- [How Pioneering CMOs are Changing the Rules of Marketing](#). The role of marketing is undergoing a monumental shift. Marketing used to be a brand steward or service for Sales but their role is becoming much more strategic as they focus on the customer experience - it has become a core business function.
- [4 ways IoT will Revolutionize Marketing Communications](#). IOT will revolutionize marketing and change core business concepts, IOT take customer interactions beyond being personal to being contextually aware. It completely transforms customer experiences and it allows the company to respond in real-time,
- [Agile marketing \(what it means in practice\)](#). Agile marketing calls for direct customer collaboration, measurable goals, an expanding project queue for teams to work against, iterative project management, and data-driven decision making.
- [How to Keep Up With Customer Expectations](#). 75% of customers WILL defect for a better customer experience. Experience includes the product and much more. It is shaped during the discovery/ordering and includes customer support services. Building solid relationships is a long-term process.

OUR LATEST BOOK!

The Real-Time Revolution: Transforming Your Organization to Value Customer Time

by Jerry Power and Tom Ferratt

Time is becoming the dominant customer currency as people increasingly use time as the yardstick as the ultimate metric that defines the customer experience. Organizations striving to provide an idea customer experience have to be cognizant of the customer's time as they seek to demonstrate to the customer that they value all aspects of the customer's journey. Companies that are winning the battle in a competitive and always-on world set the bar for others to follow.

You can order the book from [Amazon](#), [Barnes and Noble](#), or [Penguin Random House](#)

LET'S CONTINUE THE CONVERSATION

Please feel free to forward this email to your friends and colleagues who you believe would benefit from participation in our community. For those of you who wish to be included among those who believe that technology is a tool and that business success is achieved by skilled wielding of the tools available to us, feel free to reach out to us. If you have suggestions, topics you want to see included in future newsletter updates, or other general inquiries, feel free to email me at manager@i3-iot.net.

The ideas expressed in this newsletter are intended to stimulate conversation and dialog that will lead to a better understanding of our collective future. The opinions may not necessarily reflect the opinions of USC, Marshall, CTM or any other member of our community of interested people.

ABOUT CTM

Originally founded in 1985 under the guidance of USC, the Institute for Communication Technology and Management (CTM) has developed a reputation as a thought leader at the intersection of technology and business. It is not a technology first organization and it is not a business first organization; instead it is focused on developing insights on how technology impacts business and how business impacts technology and then going beyond the simple conversation in an effort to drive market and societal action.

