

Position statement of Scott McGregor, Founder and CEO of Tridimensional Innovations, (Tri-Di.com)

My Background:

I am Scott McGregor, I am an entrepreneur, high technology product designer, engineer, user experience director, graduate business instructor, and new product strategist. In my career, I've worked with dozens of start-ups, invented multiple new technology and pioneered several new markets that have fundamentally changed our lives.

I am a co-inventor of **Prescient Agents** — a forerunner of the machine learning, predictive analytic and anticipatory agent behavior that fuels much of the internet today.

I am also a co-inventor of **Web Conferencing** - which disrupted business travel and enabling meetings from our desktops in which we ship electrons to distant desktops, instead of shipping people from place to place, enabling more global collaboration and business we take for granted today.

In 2001, I led a team that developed *machine learning Bayesian Network analytics* software which allow us to find unexpected predictive relationships in all kinds of transactional data, powering the kind of big data analytics and recommendation engines which are now becoming common place.

In 2008 I was COO for Light Crafts where led development of new *image processing and image enhancement products and services*.

For the last 5 years, I have applied this background to developing decentralized, on demand, 3D manufacturing technologies. These technologies will disrupt traditional centralized mass manufacturing and global shipping. They capture personal geometries at retail locations, enabling same day or next day local manufacturing.

My new company is **Tridimensional Innovations**, We create the technologies and infrastructure to advance the production of custom ear tips, so that in the future every ear-tip is custom fit, for music, communications, hearing protection, or hearing aids. Soon you'll be able to get custom fit ear gear created on demand, in about an hour, giving you unparalleled comfort, secure fit, fidelity, and battery life, while simultaneously protecting you from sources of hearing loss.

Where have you experienced a convergence of technologies or industries?

Right now I see a many technological advances in 3D imaging, 3D manufacturing, materials science, robotics, machine learning/AI, cloud computing, ubiquitous broadband, and low cost sensors and controllers (also known as Internet Of Things). These advances are dramatically reshaping the relative costs and availability of components, as well as dramatically changing products and services they create.

There are huge changes in the cost of energy generation, pollution, transportation, labor, retail real estate, carbon taxes and cost of capital. And right now we are witnessing a potentially large shift in the cost of taxes and tariffs as well.

These changes will impact the location and labor costs of manufacturing and the nature of brick and mortar retailing. We are about to see a slow evolution in which more and more manufacturing is done locally, on demand, and customized - reducing inventory costs, waste and transportation.

For 300 years of the industrial revolution we have seen the centralization of manufacturing, driven by what was the lowest cost to the consumer. And there were several factors that contributed to the cost:

Transportation, Energy, Raw Materials, Labor, Cost of Capital, Taxes and Tariffs

Initially, production was largely at the *local* village (Smith, sawmill, weavers...). What little manufacturing existed was in mills located near water falls.

Production became regional with steam power and better transportation, allowing factories to be located near raw materials, building simple goods. This led to growth of cities such as Pittsburgh in the US and Sheffield in the UK.

The advent of the assembly line meant that factories needed a workforce for skilled manufacturing, leading to growth of cities such as Detroit, with national centralization.

Global manufacturing centers grew with the rise of global capital markets and and reduction of tariffs worldwide. This accelerated with the introduction of containers, improving transoceanic shipping such that it could truly compete with local production.

Because increasing profits have come to the most centralized factories for the last 300 years, many people assume this trend will continue. However, the declining costs of transportation and vanishing tariffs have had a lot to do with the economics advantage of centralized manufacturing.

While companies like Amazon, Uber, and containerized shipping companies have squeezed ever more cost out of transportation with better logistics, there is little waste

still to be eliminated this way. In fact, costs of transportation appear likely to rise as the world becomes increasingly willing to tax carbon emissions.

Rising costs of brick and mortar retail locations and increased competition from online retailers, will also impact this shift. When cost is the primary factor, online retailers like Amazon have the advantage. But when there is a service component to the product sale — such as capturing personal geometries to make custom fit products, the local retailer will have an advantage.

For these reasons I predict that over the next 50 years customized decentralized production will grow. The exact pace of transition is uncertain, as changes in carbon taxation, tariffs, autonomous delivery and 3d printing materials will effect the adoption rate.

One thing is certain — conversion to distributed manufacturing won't happen to all products at the same time.

Some products are small, simple, single material products (such as custom ear tips). Such products will be the first to be 3d printed on demand at retail locations.

Some products benefit dramatically from *precision* customization not possible with mass production. Your eyes, ears and teeth vary more than your finger prints, so precision of a hair width or smaller can noticeably affect enjoyment and performance of optical, audio and dental products.

How are you collaborating with start-ups, investors, customers, etc. to address the opportunities ahead?

I founded Tridimensional Innovations to create the technology and infrastructure needed to make personalized custom fit products at or near point of sale retail locations. We have collaborated with audiologists/fitters (retailers who use our technology), earpiece manufacturers, audio brands, and consumers to create a complete capture-to-finished ear gear solution.

Share a prediction of what's to come for your industry:

Quick turnaround on custom fit products at retail locations is a game changer:

Ten years ago, all custom orthotics came from just a few, typically family owned, regional “labs” using 50 year old low volume manufacturing techniques. To get one required high priced doctor appointments that took weeks to get and a return visit weeks later. Costs were high - typically over \$150 per insole.

Then, a technology company, Mechtronics, partnered with Dr. Scholl's to place kiosks in retail stores and quickly dominated the industry. In just these 10 years they grew to a

\$200+ Million/year business in the US alone. People who never would have made a doctors appointment, daily walk out of a local retailer with a custom solution, happily paying \$60/pair.

A similar revolution is poised to happen in the ear tip business. It is our intention at Tridimensional Innovations to jumpstart that revolution.

Custom products are ripe for vertical integration:

Luxottica, looked at a fragmented optical industry in the 1970s and saw the advantage of vertical integration. They acquired manufacturers, distributors, designer labels, retail optician chains (including providing in store eye exams) and the number 2 vision insurance provider. Forbes reported Luxottica now controls 80% of the global eye wear market.

The audio industry is similarly fragmented, and with the introduction of the new “hearables” fitness devices seen at CES 2017, it is likely to get more so in the near future.

But there are only a few suppliers of custom fit ear tips that could become the main supplier to the entire industry, and none of them support point of sale capture and production.

Luxottica realized that control of the eyewear supply chain begins with capturing the consumer’s prescriptions at point of sales locations. Tridimensional's retail scanning solutions allows us to capture personal ear geometries.

Custom fit solutions solve real painful problems like earbuds that hurt or fall out:

They create real performance differences like higher fidelity, longer battery life and noise protection that extends your hearing into old age. Plus, comfort and personalization allow us to delight customers, because custom fit products really are the ultimate “its all about me” products.

The disruptions in the ear gear markets caused by these new entrants could enable a successful vertical integration play for ear gear that parallels Luxotica’s growth and dominance in the optical industry.

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Tridimensional Innovations, Founder

Scott McGregor is an entrepreneur, start-up advisor, entrepreneur coach and product innovation consultant in Silicon Valley.

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