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# The Questions Executives Should Ask About 3D Printing

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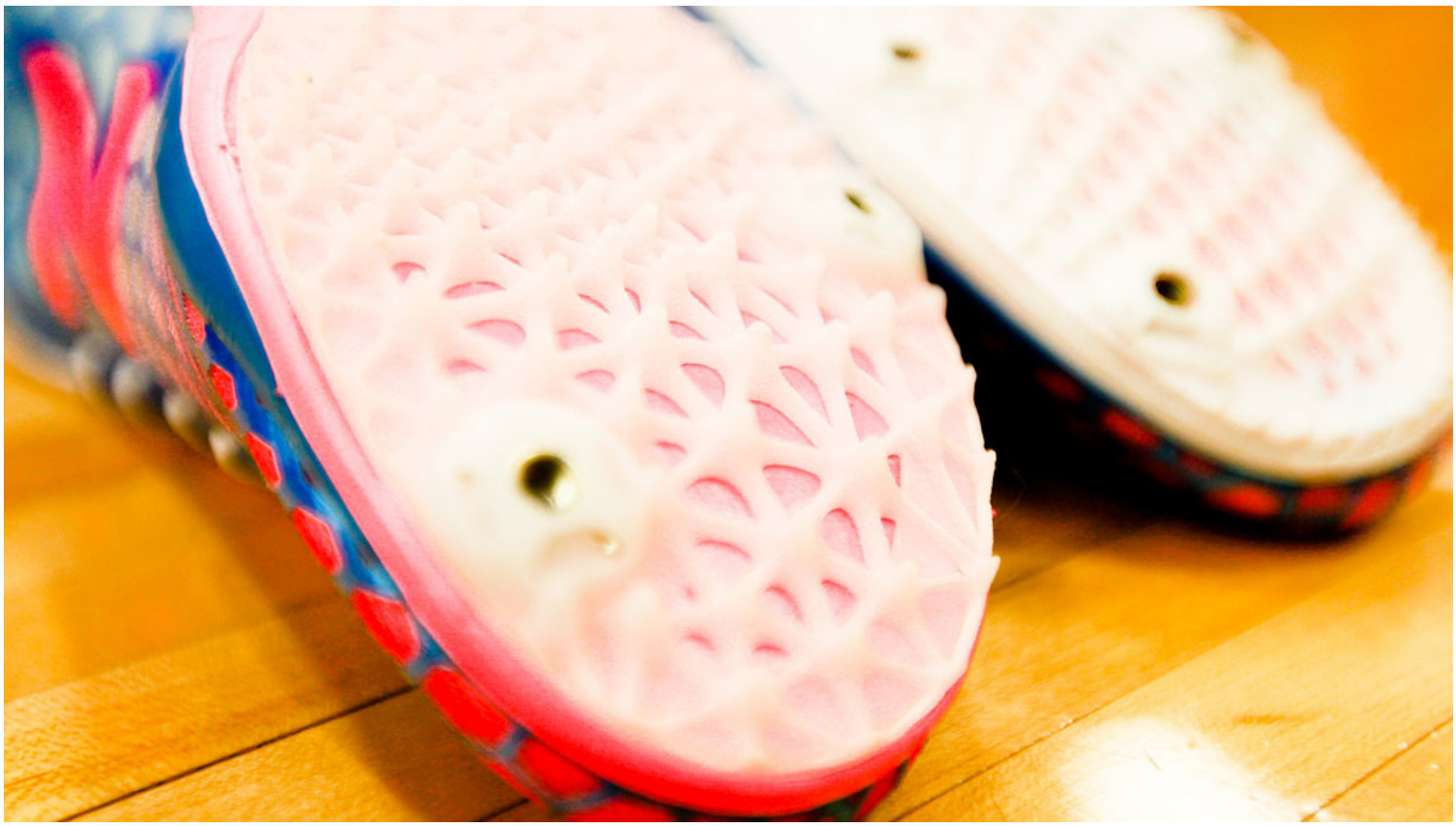

Most hearing aids in the U.S. are now custom-made on 3D printers. The U.S. Food and Drug Administration recently approved the first 3D-printed pills. Carmakers have started using 3D technology to produce parts. And last year saw the first demonstration of a digital printer producing multilayer, standards-based circuit boards. Imagine the changes afoot in the pharmaceutical, medical device, automotive, and consumer electronics industries.

3D printing is poised to redefine global manufacturing and distribution. It could upend supply chains, business models, customer relationships, and even entrepreneurship itself. It may do to physical goods what cloud computing is now doing to digital services; what the PC, internet, and smart mobility have done to personal computing; and what outsourcing did to software development and business processing – take mass distribution and innovation to the next level while realigning the very geography of work and trade.

Inherently, digital printing's "additive" manufacturing process promises to be less costly than more conventional "subtractive" manufacturing techniques – think about printing something layer by layer instead of milling a block of material into a final product. Innovation, customization, speed, and location are also among the opportunities it offers. The technology is expected to lead to reductions in the cost of employment, capital investment, shipping and inventory as well. For example, printing products on demand would significantly reduce the U.S. $1.7 trillion in inventories held by U.S. manufacturers, wholesalers, and retailers, according to a leading technology industry analyst.

Leaders of corporate strategic development need to analyze all of these considerations and be prepared for disruption to ripple through many functions – not just product development and manufacturing, but also finance, tax, legal, human resources, and IT.

In some industries, 3D printing is projected to reach the mainstream in three to ten years. Executive teams need to assess their industries' and companies' time horizons for the technology, because they will have a huge amount of strategic and business process planning to do before their companies adopt it. They should frame their analysis in terms of opportunities and threats and, of course, ask a lot of questions.

As an example of the complications ahead, let's look at taxes.

Each of the potential business benefits of 3D printing carries tax implications that could alter the equation for any anticipated operating efficiency or return on investment. And the tax risk companies face is already at an all-time high worldwide, with global digital business models posing unprecedented challenges to tax authorities and provoking conflicting tax policy from country to country. In fact, authorities working on multilateral guidelines for digital economy taxation recently

pushed off deciding, until 2020, some fundamental questions regarding a company's place of business and revenue characterization in a digital world. In doing so, they identified 3D printing among the most difficult issues.

What happens, for example, if the value of a product's underlying intellectual property overtakes its production value? (This is expected as the costs of manufacturing, transportation and other inputs decline.) How and where 3D IP is owned and authorized for use will be critical to business relationships and the characterization of the income derived from them. This will not only challenge tax departments' current calculations, but will also put increasing pressure on legal departments wrestling with IP asset and risk management. IP piracy will be another major complication.

What if 3D printers become fixtures in consumers' homes, as some suggest, with online purchases printed at will? How could ROI be undermined by unanticipated value-added taxes or goods and services taxes (VAT/GST) – among the many different direct and indirect taxes that will come into play – with rates in Europe ranging from 3% to 27%?

Consider the relatively simple example of customs duties: 3D printing will change cross-border flows of tangible goods. While the raw materials or components used in 3D printers may still physically cross borders – triggering taxable customs events – more of a product's value will be defined by intangible blueprints transmitted digitally. Faced with losing considerable customs revenue, governments may look to impose new taxes on these blueprints and other IP.

And, while CFOs know that every time they change their supply chains, they need to adjust intercompany cost-sharing of taxable functions, risks, and assets, they may not realize how much 3D printing could test existing models for such transfer pricing.

Compounding any particular tax issue are requirements for compliance and reporting, which involve activities ranging from country-by-country registrations to continually updated ERP systems. As manufacturing becomes more geographically distributed, for example, it will encounter rules that often change from jurisdiction to jurisdiction. (For more detail on 3D printing and taxation issues, see EY's recent report.)

Of course, 3D printing has not transformed the economy quite yet. It's too early to answer the countless questions this disruptive new technology will raise. But it is certainly not too early to start defining the questions and planning for possible scenarios.

Moving forward, consider the following questions for strategic development:

**Opportunity analysis**

- What would be the cost/benefit of flattening your supply chain and moving production closer to your markets?
- How could digital printing improve your innovation, product development, and speed to market?
- How could digital printing and its promise of mass customization change your relationships with customers?
- Are there entirely new lines of business that your company could only execute in a 3D world?
- Are there operations you would shed?

**Threat analysis**

- How could 3D-printing upstarts exploit the benefits of speed, cost, and customization to compete against you?
- How will you protect your IP from piracy or other loss of value?
- Could your brand face quality erosion or other damage as your designs are distributed and modified in a shared economy model?
- Could your 3D business proposition be undermined by tax costs?

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