



## GUEST EDITORS' PERSPECTIVE

# The generative potential of emerging technology to support startups and new ecosystems



Boyd Cohen <sup>a,\*</sup>, José Ernesto Amorós <sup>b,c</sup>, Lawrence Lundy <sup>d</sup>

<sup>a</sup> EADA Business School & Universidad de Vic, Barcelona, Spain

<sup>b</sup> EGADE Business School, Tecnológico de Monterrey, Mexico

<sup>c</sup> Universidad del Desarrollo, Chile

<sup>d</sup> Outlier Ventures, London, UK

## 1. Introduction

A 3-D printer demonstration was held at a recent children's event organized by the university where one of us works. And while some of the children seemed interested in the technology in general, most anxiously awaited the little gift pieces that were being printed: fidget spinners. The 3-D printing laboratory administrator commented that the cost of printing one of these spinners is less than \$1 USD, while the average retail price is about \$10 USD<sup>1</sup>.

Although this story of printed spinners is a seemingly simple example, the impact technology asserts on many of our day-to-day activities is profoundly important. Soon enough, 3-D printers will be capable of replicating themselves and the cost of personally owning a 3-D printer will make them accessible to a large population of makers and prosumers. Will we all have 3-D printers in our homes? What will the implications be for traditional manufacturing industries? It is difficult to predict. Only 10 years ago, most of us couldn't imagine that a smartphone would change the fortunes of one of the

most important and highest-valued companies in the world (Apple), let alone that this technology and its subsequent applications would change the way we communicate, access information, and generate new business models with unlimited repercussions. Without smartphones, new ventures like Uber—which, through its business model, radically changed the transportation industry—would not have been possible. Thus, Joseph Schumpeter's (1912) ideas about how innovative entrepreneurs provoke a creative destruction are more relevant today than ever. In recent years, the pace of technological innovation—particularly digital innovation—has accelerated at unprecedented rates (Nylén & Holmström, 2015).

With this special issue of *Business Horizons*, we aim to highlight emerging transformational technologies and their capacity to serve as generative mechanisms for disruptive innovation and entrepreneurial opportunities. Our main objectives are twofold: We want to (1) contribute to the knowledge dissemination and discussion regarding the role of emergent new technologies and entrepreneurship activities in the creation of business models that are changing the traditional approach of the industrial economy, and (2) try to close the gap caused by lack of research on some of the most important emerging trends and technologies shaping entrepreneurship in the coming decades.

\* Corresponding author

E-mail addresses: [bcohen@eada.edu](mailto:bcohen@eada.edu) (B. Cohen), [amoros@itesm.mx](mailto:amoros@itesm.mx) (J.E. Amorós)

<sup>1</sup> Henceforth, all figures in this piece are given in U.S. Dollars.

## 2. Disruptions due to digitalization

It is impossible to miss the rapid acceleration of digital technologies that are reshaping markets and society globally (Nambisan, Lyytinen, Majchrzak, & Song, 2017). Increasing digitalization is not considered wholly positive, however, as the unprecedented rate of disruptive digital innovation is leading to legitimate concerns about the future of work. Consider the case of Foxconn, Apple's major manufacturing outsourcer. In 2016, Foxconn automated one of its Chinese factories in a cost-savings measure, leading to the elimination of 60,000 jobs. Meanwhile, in early 2017, JP Morgan announced the layoffs of 600 financial analysts who are being replaced by automated trading systems. Of course, the hundreds of thousands of Uber drivers around the world are on course to be automated out of jobs in the coming years as well (Bansal & Kockelman, 2017).

Despite this gloomy picture of how digitalization may result in massive job losses across many industries, digitalization is opening up fascinating innovation opportunities for entrepreneurs. Most of this special issue focuses on these entrepreneurs, and the sectors and business models that are being disrupted. On a recent trip to Bangalore for immersion in the sustainable-valley-of-India entrepreneurial ecosystem, one of us visited the innovation arms of both Microsoft and GE. Executives from the two companies specifically stated that they are less concerned about what other major multinationals are doing, because this competition is more predictable; what concerns them most is how a startup could unexpectedly leverage disruptive technologies and totally reshape the industry overnight. Here's to the bold entrepreneurs who aspire to do just that!

### 2.1. Sharing platforms

Perhaps no other digital disruption has been more powerful in rapidly transforming industries than the emergence of two-sided platforms for sharing and exchange. The ubiquitous nature of the internet—and smartphones—in much of the developed world has helped to spawn a wave of disruptive platform technologies;

*The world's largest taxi firm, Uber, owns no cars. The world's most popular media company, Facebook, creates no content. The world's most valuable retailer, Alibaba, carries no stock. And the world's largest accommodation provider, Airbnb, owns no property. Something big is going on.* (Hamish McRae, 2015)

Of course, some of these platform companies have come under national and local government scrutiny for their failure to meet regulations; mistreatment of independent contractors (often referred to as *gig economy entrepreneurs*, and who in some jurisdictions must be claimed as employees); failure to pay taxes; and negative local impacts on communities. How value is created and distributed amongst these platforms has become a significant topic within the sharing economy, leading to discussions of dichotomous platform types: platform capitalists (or *deathstars*) versus platform cooperatives (Muñoz & Cohen, *in press*).

To begin this special issue, Oliveira and Cortimiglia (“Value co-creation in web-based multisided platforms: A conceptual framework and implications for business model design”) introduce a conceptual model aimed at unpacking the business models for value creation and exchange within two-sided platforms. They pay particular attention to co-creating value in such platforms, merging concepts from open innovation and business model design to introduce useful models for entrepreneurs pursuing startups in the platform space.

Speaking of business models and the sharing economy, Todeschini, Cortimiglia, Callegaro-de-Menezes, and Ghezzi (“Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges”) leverage data collected from eight innovative fashion startups to introduce the concept of ‘born-sustainable business models.’ These models leverage a combination of several key emerging sustainable paradigms, including the circular and sharing economies and materials innovation.

Finally, another business model that can have significant sustainability benefits is one that encourages private asset owners to share access to their resources (e.g., cars, boats, homes). In this category of sharing platforms, Wilhelms, Merfeld, and Henkel (“Yours, mine, and ours: A user-centric analysis of opportunities and challenges in peer-to-peer asset sharing”) explore peer-to-peer (P2P) asset sharing schemes with a particular focus on P2P car-sharing startups. While car sharing has existed for decades, platform technologies and changing consumer preferences have opened up new approaches to the practice. Instead of a company acquiring vehicles to place in neighborhoods around the city using models we refer to as business-to-crowd (e.g., Zipcar), P2P car sharing changes the dynamic by having private owners of cars make their vehicles accessible to a P2P community platform during the car's downtime (most personal vehicles spend about 95% of the time parked). While more consumers are opening up to the idea of gaining

access to—instead of ownership of—assets, many owners of homes, cars, et cetera are still nervous about provisioning access of their assets to the crowd. In hopes of assisting P2P entrepreneurs in reaching their target audience, this article provides an understanding of the typologies of asset owners who may be more willing to share their assets.

## 2.2. Maker communities

Though it has received scant attention from scholars and the media, a growing movement has taken place in the maker community over the past decade or so. In their book, *The Emergence of the Urban Entrepreneur*, Cohen and Muñoz (2016) highlight how a range of trends—including urbanization, collaboration, and democratization of the tools of innovation—are driving new forms of entrepreneurship globally. One such trend gaining significant traction is the maker movement. As average individuals have procured increasing access to tools such as 3-D printers, laser cutters, and flexible manufacturing, there has been a blossoming of makers leveraging not just the tools but also the aforementioned platforms in order to receive exposure and sell their products, designs, and services. Consider the case of Fab Labs, which got its start from a project conducted at MIT. Today, over 1,100 Fab Labs have been established worldwide, offering open access to tools for prototyping and community building amongst makers. Born of the Fab Lab movement, the Fab Cities initiative aims—by 2054—to have cities facilitate and locally produce through their maker communities at least 50% of products consumed. This suggests a massive transformation of our economies from the ground up (Cohen, Almirall, & Chesbrough, 2016). Three articles in this special issue explore the maker community from different perspectives.

First, tying into our last category of sharing platforms, Langley, Zirngiebl, Sbeih, and Devoldere (“Trajectories to reconcile sharing and commercialization in the maker movement”) explore one of the biggest tensions in the sharing and maker community: how to balance desire to contribute to the greater good/community with earning a living or even creating significant profit from maker activities. Leveraging a sample of five different maker cases, the authors illustrate how makers—mostly in the 3-D printing space—evolve their approaches over time in hopes of balancing the seemingly conflicting logics of community contribution and income generation.

Disruptive innovations also offer the possibility of global design and local manufacturing, as well as local design and global manufacturing. In their

article, Hamalainen and Karjalainen (“Social manufacturing: When the maker movement meets interfirm production networks”) examine emerging collaborations between makers and manufacturers, focusing on two main types of collaborations: (1) when established firms outsource manufacturing tasks to individual maker-entrepreneurs and (2) when makers and designers outsource production to manufacturing firms. Some readers may have heard the story of Ryan Gepper. By leveraging locally available prototyping equipment in San Diego, Gepper was able to develop a 21<sup>st</sup> century cooler for beverages, complete with innovations including LED lights, built-in speakers, a blender, and a plug to charge smartphones. With no outside investment, no startup team, and no in-house production, Gepper launched a Kickstarter crowdfunding campaign in hopes of generating at least \$50,000 in presales. Instead, he raised more than \$13 million. Gepper’s Coolest Cooler campaign and subsequent need to scale up production of his innovation is a good example of the maker/inventor who seeks to outsource production to an established manufacturing firm. With the growth of Fab Labs and other prototyping facilities globally, this kind of collaboration will only escalate.

Digitalization has been a driver of the physical printing of objects in the maker community. The ability to create product designs using an array of software tools has facilitated the electronic dissemination of such designs globally. For example, rather than outsourcing production of his Coolest Cooler to China, Ryan Gepper could have instead sold the digital designs via a range of emerging platforms for sharing digital maker files, enabling buyers to personally print and produce their own Coolest Cooler. This is not science fiction! One such platform that enables the distribution of digital maker files is Thingiverse, which is explored in the last article of this section. Having conducted in-depth interviews with eleven digital maker-entrepreneurs, Troxler and Wolf (“Digital maker-entrepreneurs in open design: What activities make up their business model?”) introduce a model of seven components—so called ‘building blocks’—that contribute to the array of emerging business models observed from their case studies.

## 2.3. Digital tech infrastructure

Rapid decline in the cost of sensors, growing ubiquity of the internet/broadband infrastructure, and increasing power of analytics/big data are ushering in a wave of disruptive innovations in industries—including those previously not thought to be digital in nature. The range and growth of

underlying digital infrastructure is proving to be generative for entrepreneurs and multinational companies alike. In 2016, 11 billion devices were connected to the internet; estimates suggest that by the year 2025, this number will be 80 billion (Kanellos, 2016). Five articles in this special issue explore the entrepreneurial opportunities that are emerging to contribute to or leverage such digital infrastructure.

Sensors are at the core of much of the digitalization we are witnessing. Consider the previously mentioned smartphone. Apple's iPhone contains six sensors: proximity, accelerometer, ambient light, moisture, gyroscope, and compass. Now, sensors are being placed in a plethora of consumer, business-to-business, and infrastructure devices. In his contribution to this special issue, Brown ("Sensor-based entrepreneurship: A framework for developing new products and services") introduces a useful framework for understanding where entrepreneurial opportunities will emerge for sensor innovators, leveraging a matrix of crowd-versus-individual data aggregation and individual-versus-environment sensor location.

Sensors, of course, are driving the growth of the Internet of Things (IoT). Devices are becoming increasingly interconnected and capable of generating unlimited amounts of real-time information, which in turn drives big data opportunities. In this area of study, Krotov ("The Internet of Things and new business opportunities") explores how the socioeconomic, technological, and physical environments converge to create new opportunities for startups through the escalating capabilities of IoT.

Over the past decade, smart cities have emerged as an interesting opportunity space for IoT startups and multinationals, and have introduced new public-private collaborations. For example, the city of Santander, Spain, received EU funding for the rollout of nearly 20,000 sensors throughout the city with the goal of facilitating a platform for IoT and real-time monitoring of a range of city infrastructure and citizen experiences including transportation, air quality, parking, and even augmented reality for tourists. In order for cities and their citizens to optimize the plethora of sensors and IoT services being considered, high-speed broadband throughout the urban area is critical. Illustrating this idea, Sarma and Sunny ("Civic entrepreneurial ecosystems: Smart city emergence in Kansas City") share emerging insights from Kansas City's pioneering collaboration with Google to become a gigabit city and turn this infrastructure into a generative mechanism for supporting a vibrant entrepreneurial ecosystem.

The automotive industry is another arena that is experiencing massive disruption due to sensors and

IoT. Historically, this industry has experienced very few disruptive innovations and has not been particularly attractive to entrepreneurs because of high barriers to entry. Things are changing, however, in large part due to trends in electrification and digitalization. In April 2017, Tesla surpassed Ford and GM to become the highest-valued automotive company in the U.S. One could ask: In an industry so difficult for startups, how can a company that produced only about 75,000 cars in 2016 (compared with almost 10 million for GM) and no profits be worth more than GM and Ford? The answer is that most investors are banking on the future of automobiles to be electric and autonomous. Clearly, Tesla is the world leader in rolling out high-quality electric vehicles. While we may not see hundreds—or even dozens—of other automotive startups competing with Tesla and industry incumbents, for the first time in recent memory, there is a legitimate opportunity for entrepreneurs to enter the automotive industry by participating in the IoT, sensor, electrification, and autonomous revolutions that are poised to disrupt and transform this industry in the coming decades. Thankfully, Ferràs-Hernández, Tarrats-Pons, and Arimany-Serrat ("Disruption in the automotive industry: A Cambrian moment") provide us with insights regarding the pending disruptions and entrepreneurial opportunities in the automotive sector.

Another incredibly disruptive digital infrastructure has emerged in the form of blockchain, or distributed ledger technology. Blockchains have had a tumultuous, short history since Satoshi Nakamoto first conceptualized the technology in 2008 as a chain of hash-based proof-of-work that would allow the sending of payments from one party to another without going through a financial institution. For the first few years, blockchain technology was synonymous with the Bitcoin network and cryptocurrency. Recently, however, there has been a decoupling of Bitcoin from the underlying blockchain. The properties that are useful in designing a peer-to-peer electronic cash system also turn out to be valuable for other applications in which centralization is inefficient or impossible. This insight has prompted an explosion in innovation not just in online payment and finance, but also across almost all sectors of the economy. It is now clear that Bitcoin was the first application to utilize this powerful, flexible software platform called a blockchain. A thousand flowers are now blooming on all sorts of blockchains, with new features such as automated contracts (Ethereum) and automated decision-making (Tezos).

Entrepreneurs and startups are applying these new tools to solve problems in myriad industries.

Blockchains have the potential to undermine business models predicated on extracting monopoly rents from brokerage positions in the value chain. Any company that provides trust between a buyer and a seller in a market (e.g., legal services, auditing, payment processing) is vulnerable to blockchain automation. More broadly, though, blockchains do not just disrupt; they also offer new value creation opportunities. As transaction costs are reduced, new types of economic activity become viable: micropayments, machine-to-machine transactions, data monetization, et cetera. Blockchains and other associated decentralization tools provide nothing less than the infrastructure for Web 3.0. Just since 2012, more than \$1.7 billion in venture capital has been invested in blockchain-related startups (CoinDesk, n.d.). Furthermore, the two most successful cryptocurrencies—Bitcoin and Ethereum—have a combined current market value of more than \$50 billion. We are grateful to have in this special issue an article by Larios-Hernández (“Blockchain entrepreneurship opportunity in the practices of the unbanked”) that explores the potential entrepreneurial opportunities in leveraging blockchain to provide alternative banking solutions for those base-of-the-pyramid individuals who lack access to traditional banking services.

We would be remiss, however, if this special issue focused only on disruptive digital innovation. While makers and 3-D printing offer hybrid digital-physical solutions, emerging hardware innovations may also generate disruptive entrepreneurial opportunities. The rapid evolution of drone technology is one such arena. As reported by Giones and Brem (“From toys to tools: The co-evolution of technological and entrepreneurial developments in the drone industry”), the drone industry is projected to reach \$127 billion by 2020. While this industry is poised to disrupt a range of industries from inspection and logistics to photography, most drone usage thus far has been for fun rather than business. In the final article of our special issue, Giones and Brem shed light on how the drone industry will transform from toys to tools for industry and have a real impact on people’s lives.

### 3. Conclusion

Can a whole industry or multiple industries experience radical change due to the emergence of disruptive technologies? Since the first Industrial

Revolution, we have known that the answer to this question is ‘Yes.’ The late 20<sup>th</sup> and early 21<sup>st</sup> centuries have witnessed such changes in the form of recorded music, telecommunications, healthcare, e-commerce, and others. The pace of technology innovation is not slowing down, generating a seemingly exponential number of impactful waves—tsunamis, even—of disruption. We are living in exciting times, when a range of technologies are converging and democratizing in ways that give entrepreneurs access to become innovators across every sector of society. As guest editors, we hope that this special issue will shed light on some of the most compelling technologies and entrepreneurs enabling innovative business models that will help shape our economies and our lives in the coming decades.

### References

- Bansal, P., & Kockelman, K. M. (2017). Forecasting Americans’ long-term adoption of connected and autonomous vehicle technologies. *Transportation Research Part A: Policy and Practice*, 95, 49–63.
- Cohen, B., Almirall, E., & Chesbrough, H. (2016). The city as a lab: Open innovation meets the collaborative economy. *California Management Review*, 59(1), 5–13.
- Cohen, B., & Muñoz, P. (2016). *The emergence of the urban entrepreneur: How the growth of cities and the sharing economy are driving a new breed of innovators*. Santa Barbara, CA: Praeger.
- CoinDesk. (n.d.). *Blockchain venture capital*. Available at <http://www.coindesk.com/bitcoin-venture-capital/>
- Kanellos, M. (2016, March 3). 152,000 smart devices every minute in 2025: IDC outlines the future of smart things. *Forbes*. Available at <https://www.forbes.com/sites/michaelkanellos/2016/03/03/152000-smart-devices-every-minute-in-2025-idc-outlines-the-future-of-smart-things/#666f40504b63>
- McRae, H. (2015, May 5). Facebook, Airbnb, Uber, and the unstoppable rise of the content non-generators. *The Independent*. Available at <http://www.independent.co.uk/news/business/comment/hamish-mcrae/facebook-airbnb-uber-and-the-unstoppable-rise-of-the-content-non-generators-10227207.html>
- Muñoz, P., & Cohen, B. (in press). Mapping out the sharing economy: A configurational approach to sharing business modeling. *Technological Forecasting and Social Change*.
- Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research in a digital world. *MIS Quarterly*, 41(1), 223–238.
- Nylén, D., & Holmström, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons*, 58(1), 57–67.
- Schumpeter, J. A. (1912). *The theory of economic development*. Cambridge, MA: Harvard University Press.