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SUMMARY

Open innovation is now a widely used concept in academia, business, and policy making. This article describes the state of open innovation at the intersection of research, practice, and policy. It discusses some key trends (e.g., digital transformation), challenges (e.g., uncertainty), and potential solutions (e.g., EU funding programs) in the context of open innovation and innovation policy. With this background, the authors introduce select papers published in this Special Section of *California Management Review* that were originally presented at the second annual World Open Innovation Conference, held in Santa Clara, California, in December of 2015.

KEYWORDS: innovation, policy making, public policy, Europe, open innovation

Open innovation has emerged as an important concept in both academic research and industrial practice, and it is now also becoming increasingly important in the public policy domain. For example, Hilgers and Ihl highlighted the potential of "citizen sourcing" as a way to apply open innovation to the public sector.[1] They collected several examples in relation to citizen ideation and innovation, collaborative administration, and collaborative democracy—such as the Inducement Prices by the National Science Foundation (NSF), the Peer-to-Patent initiative, and AmericaSpeaks.org as a "21st Century Town Hall Meeting." The notion of open government has also received more attention, as exemplified by Barack Obama's earlier call for new forms of collaboration to increase the innovativeness of public service delivery.[2] In the context of open innovation, there is increased awareness of the importance of considering nonprofit purposes, while public and nonprofit organizations need to be linked to other stakeholders to get a more complete picture of how innovation can be done more efficiently and effectively.[3]

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Effective policy making built around open innovation must harness the value-added of openness in science, and yet also promote the investment needed to transform open initiatives into new technologies and new business models. This is the essence of the Three Opens (Open Innovation, Open Science, and Open to the World) that one of us has discussed at length.[4] On this basis, a vision for Europe acknowledges, "the way that science works is fundamentally changing and an equally important transformation is taking place in how companies and societies innovate. The advent of digital technologies is making science and innovation more open, collaborative, and global."[5]

The treatment of open access scientific journals within Europe illustrates the balancing on these forces. The European Commission now requires researchers to publish open access and refunds costs incurred in paying publishers for this service. Moreover, science ministers from all EU countries have agreed that all publicly funded research be published in open access journals. So the publishers get some time to adjust their business models while the entire EU will soon benefit from much more widespread dissemination of the research it funds.

Building on these developments toward more openness, the aim of this article is to better connect open innovation research, practices, and policies to inform scholars, managers, and policymakers about current trends and future directions. We do this by describing the state of open innovation research, as we know it from relevant academic work in that domain, and by providing an overview of some policy considerations and recommendations. At the same time, we use this opportunity to introduce the articles that were selected on the basis of the World Open Innovation Conference (WOIC) in 2015 that *California Management Review* (*CMR*)[6] graciously agreed to publish in a special section in this issue.

A Brief History of Open Innovation

Open innovation has become a new paradigm for organizing innovation. It was originally introduced by Chesbrough in his 2003 book *Open Innovation: The New Imperative for Creating and Profiting from Technology*.[7] Open innovation assumes that firms can and should use external ideas as well as internal ideas, and internal as well as external paths to market, as they look to advance their innovations. Open innovation processes combine internal and external ideas together into platforms, architectures, and systems. Open innovation processes use business models to define the requirements for these architectures and systems. These business models access both external and internal ideas to create value while defining internal mechanisms to claim some portion of that value.

Open innovation has been defined in 2014 by Chesbrough and Bogers as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries."[8] It provides insights into how firms can harness inflows and outflows of knowledge to improve their innovation success.[9] It has become a popular (and well-cited) area of innovation research.[10] Current research on open innovation is extending into a wide set of areas and domains, such as small and medium-sized enterprises (SMEs), new units of analysis, different

high- and low-tech industries, and not-for-profit organizations and public policy.[11] Moreover, increasing attention has been paid to the contingencies of open innovation processes.[12]

There are two important kinds of open innovation: outside-in and inside-out—also referred to as inbound and outbound open innovation, respectively.[13] The outside-in part of open innovation involves opening up a company's innovation processes to many kinds of external inputs and contributions. It is this aspect of open innovation that has received the greatest attention, both in academic research and in industry practice.[14] Inside-out open innovation requires organizations to allow unused and underutilized ideas to go outside the organization for others to use in their businesses and business models. In contrast to the outside-in branch, this portion of the model is less explored and hence less well understood, both in academic research and also in industry practice.

Because innovation is an inherently complex and dynamic social process, there is tremendous value in connecting theory and practice. Indeed, effective policy requires policymakers to have a comprehensive understanding of what *might* work in theory and what *is* working in practice. In 2014, the Garwood Center for Corporate Innovation at UC Berkeley's Haas School of Business launched a new conference with the explicit intention of bringing academic innovation scholars and industry innovation practitioners together. The inaugural WOIC was held in Napa Valley, featuring scholars such as David Teece and Ikujiro Nonaka, and featuring innovation managers from organizations such as NASA and Intel.

The second edition of the conference was held in the heart of Silicon Valley, and we had 164 attendees, with half of them coming from academia and half from industry. We were fortunate to have the active participation of the senior editorial staff of *CMR* at the conference, and the articles in this special section have all been reviewed according to *CMR*'s editorial standards. *CMR*'s editorial focus strongly complements the intentions of the WOIC conference.

The rise of open innovation, as a concept and also as a research field and community, is due to a number of factors. A fundamental notion is that knowledge for innovation is widely distributed in the economy,[15] or in more popular terms, "most smart people work for someone else."[16] Some key "erosion factors"[17] that have amplified the importance of open innovation include the increased mobility of workers, more capable universities, declining U.S. hegemony, growing access of startup firms to venture capital (VC), and the rise of the Internet, social media, and the supporting information and communication technologies (ICTs).[18] Below, we follow up on this background by describing some of the key challenges and opportunities of innovation policy.[19]

Challenges and Opportunities for Innovation Policy

The Challenge of Uncertainty in Innovation

A main challenge for those dealing with innovation policy is uncertainty. On the nexus of public policy, political science, and economics, there is uncertainty as to which policies actually promote innovation. There is also uncertainty

about the real impact of innovation on growth, in terms of size and direction. This ambiguity is illustrated by Robert Solow, who once said "that we see the computer age everywhere except in the productivity statistics."[20] In terms of impact, we also need to acknowledge that innovation does not always lead to results equally across organizations and people. In fact, while innovation can be the great leveler, it can also be the great divider.

Uncertainty is also linked to the context we are living in and the trends we are experiencing. Specifically, there is uncertainty as to which emerging disruptive technologies we should publicly encourage in order to promote welfare. This uncertainty is not new, but it has never been so intense. Even though many would argue that the impact of innovation on growth has been somewhat disappointing, the current trends in innovation give ample grounds for optimism.

Nurturing the Opportunities of Digital Transformation

It is important to consider how we can nurture digital technologies toward a positive social and economic impact. Following Steve Case,[21] we can identify three major waves in Internet and digital technologies. In the first wave, we built the infrastructure of the Internet. These were the actual physical infrastructure and protocols. In the second wave, we built the applications on top of that infrastructure. This is the world of social networking sites and smartphone apps. Now we may be at the cusp of the third wave. This is when digital technologies and the Internet leave the traditional infrastructure and finally move to the highly regulated sectors of health, energy, transport, or finance. This is the world of Machine Learning, Quantum Computing, Blockchain, the Internet of Things (IoT), the world of sensors, and the world of "big data." It is the world where bits, atoms, and even cells combine in new and interesting ways.

When we consider this new trend, we may be failing to see the computer age in the productivity statistics because, in fact, it was not "everywhere," as Robert Solow suggested. It was only in very limited, though highly visible, sectors of our economy. If this thesis is right, then our current stagnation in productivity growth is more temporary than we think. We may be transitioning to a new higher plane of productivity growth.

The relevant emerging technologies that enable the third wave have a strong technological and scientific component. Bringing the technological and scientific component together implies a creative combination of hardware and software. The importance of bringing together these different components is exemplified by Bitcoin and Blockchain that have at their core major breakthroughs in mathematics and cryptography. Or think of CRISP/Cas9, which involves both advanced science and practical engineering. Or consider electric, connected, and automated cars, which depend on a seamless union of software and hardware. For example, a major competitive advantage of Tesla over competitors is their proprietary software that manages the efficiency of their batteries. This shows that the most significant emerging technologies are highly scientific in nature and that the distance between technology and science is decreasing.

This is potentially good news for Europe, with its strong technical and scientific base. And it is certainly good news for Horizon 2020, the EU's €77 billion program, one of the few major funding programs that cover all stages of the research and development chain, from curiosity-driven research to partnerships with industry for advanced demonstrators. Many of these technologies are in the early stage of development, and there is still a lot of uncertainty around them. But if they succeed in entering into the market, we will see digitally enabled technologies managing to break into those highly regulated areas that we mentioned earlier—the ones that were so difficult to enter until now. Ultimately, this may have a positive impact on economic growth, and an increased diffusion of these innovations may lead to an uplift in productivity across the economy.

A New Horizon for Openness

When we put openness in a historical perspective, we may refer to Stefan Zweig's observations of how the world was open in those 50 years before 1914.[22] The gold standard was a kind of common currency, and people would travel across borders without a passport. However, the two World Wars that followed reflected greater nationalism and protectionism, which led to a decrease in economic growth. We now know that openness makes us more effective and more competitive, and it makes us better people too. At the same time, science is changing, and the way we use science to solve global problems is changing, too.

One reason why open innovation is so crucial in today's economy is the uneven growth in productivity and prosperity. Indeed, the work of the OECD shows that the overall slowdown in productivity is not present everywhere.[23] In fact, the leading companies have been rapidly increasing their productivity over recent years. These productivity improvements are concentrated in markets such as ICT and in companies that are using digitization. At the same time, many other companies are stagnant, with virtually no increase in productivity. This includes major parts of the real economy, such as health care and government services. And the gap between the leading companies and everyone else is growing. While the cities and regions where the productivity leaders are located are powering ahead, other regions do not benefit from this. At the same time, the individuals with the right skills are benefitting, but others are not. This lack of diffusion from the top to the bottom and across sectors feeds inequality, which has a huge cost for all of us as it translates into wasted resources, wasted talent, and wasted potential.

This lack of diffusion can be attributed to demand-side and supply-side constraints. On the one hand, demand-side constraints entail that consumers, in rich economies, spend the bulk of their income on health, education, transportation, housing, and retail goods, which are the areas that have not seen much impact from digitization and productivity improvements. However, the aforementioned "third wave"[24] describes how digitalization may transform traditional sectors in the coming years. On the other hand, the supply-side constraints are

concerned with the question whether the innovation sector has access to *ideas* that create new markets and *capital* in order to scale those ideas up. This involves innovations that combine physical and digital, that put the users at the center, and where newcomers with new business models will enter and rapidly create entirely new markets. All of this involves open innovation. Innovations that create new markets do not fit neatly in existing sectors.

In a digital world, there is a paradigm shift where innovation is no longer a linear process but one where the user is feeding back to the producer what innovation is needed.[25] More generally, at the core of open innovation is the ability to create an ecosystem where people, organizations, and sectors can foster co-creation.[26] It involves business models—the logic of creating and capturing value—that dynamically transcend organizational boundaries within that innovation ecosystem.[27]

A Policy Response toward Embracing Uncertainty and Openness

By examining how the combination of digital transformation and openness affect business and economic development, we can highlight the implications of these trends for policies to support science and innovation.

First, policies in relation to science and innovation need to promote better linkages between the two. For example, there is a mandate to all of the research projects funded under the European Commission umbrella to open up the results—and, where possible, the datasets they generate—in a way that they are free to access, to use, and to combine in new ways. Moreover, this may involve more emphasis on public-private partnerships to promote strong links between universities (along with other technology research organizations) and industry.

Second, policies to embrace uncertainty are needed. For example, the European Commission's key initiative is major reform in the funding instruments for innovation. The recently announced European Innovation Council is a tribute to the successful program for frontier science, which is the European Research Council. The objective is to break down the silos present in today's funding schemes for innovation through predefined calls for proposals (e.g., one for energy, one for transport, one for digital). This will allow for complex problems to be addressed, given that the most interesting disruptive innovations happen at the intersection of disciplines and sectors.[28]

Third, there is a need to increase private investment, especially for innovations where the levels of uncertainty (technological, business model, regulatory, and user acceptance) are high. In 2014, VC investment across the EU was around €5 billion, while in the United States, it was €26 billion.[29] The average size of a VC fund in Europe was €60 million, while in the United States, it was €120 million. In Europe, there is a problem of scale, fragmentation, and lack of private funds in VC. To address this issue, the European Commission, together with the

European Investment Fund, is setting up a number of Venture Capital Fund-of-Funds worth more than €1.6 billion. These several Fund-of-Funds will invest in a combination of early stage, later stage, and expansion stage VC funds, with a majority of capital coming from the private sector, and with an independent fund management. This would bring an entirely new momentum to the European VC market and increase investor confidence.

Finally, there are polices in relation to regulation and innovation. The idea is that the European Commission and other public authorities should not only provide funding, but also help the companies they fund navigate the complexities of regulation—as a kind of "after-sales service." If we want these emerging technologies to enter the highly regulated but highly impactful sectors of health, finance, energy, or transport, then we need to help entrepreneurs and scientists better understand the regulatory framework. Aiming at mutual learning, it is critical to avoid regulation becoming a major obstacle, but instead turn it into a major accelerator of the coming wave of innovation.[30] For example, the Innovation Deals involve bringing together national authorities, European authorities, and regulators to help identify and address perceived legislative barriers more quickly by providing more clarity or identifying solutions within existing legislation.

The Future of Open Innovation Research, Practice, and Policy

New Trends and Challenges for Open Innovation

Open innovation will play a key role in the developed economies over the next decade. There will be new technological trends that will fuel innovation, from blockchain to digitalization to genomic editing. These will be joined by international goals, such as the Sustainable Development Goals (SDGs) for 2015-2030.[31] These SDGs can themselves be harnessed as a further impetus to open innovation. The rise of China's economy also poses opportunities and challenges for open innovation. On the one hand, the rise of hundreds of millions of middle-income consumers will offer a tremendous boost to growth throughout the world. On the other hand, the policy preference for "made in China" poses barriers for foreign companies seeking to expand their positions in China.

Innovation itself will continue to evolve, and so policy must also be prepared to adjust. The rise of crowdfunding, for example, creates new sources of financial support for startup ventures. However, crowdsourcing also creates hazards for unsuspecting supporters. Similarly, the growth of Initial Coin Offerings has stimulated lots of excitement, but these vehicles are poorly understood, and our regulatory policies are far behind in managing the risks these pose to investors. And the continued rise in importance of innovation ecosystems has important implications for antitrust regulation, which remains anchored in an earlier model of competition. Consumers will still need antitrust protection, but cooperation between competitors can be pro-social in certain open innovation contexts.

Introduction to the Articles in the Special Section on Open Innovation

The articles in this *CMR* Special Section on Open Innovation highlight some specific aspects that are part of the agenda as described above. They address issues ranging from crowdfunding to coopetition,[32] from startups to incumbent firms, and from frameworks to understand the complexities of open innovation to tools to proactively deal with them.

In one of the articles, Cano-Kollmann, Hannigan, Mudambi, and Snehal ask the question: "What happens when firms in an oligopolistic industry find themselves lagging behind in a potentially dominant technology?"[33] Their study of a global alliance in hybrid-electric drivetrain automotive technology shows some of the mechanisms of how firms that are lagging behind in technology development need to open up to collaboration with industry leaders in order to catch up in their respective technology domain. Using a real options framework, the article provides some important implications for how to manage uncertainty and how open innovation plays a role in that process.

The article by Di Pietro, Prencipe, and Majchrzak focuses on startup firms with a specific emphasis on how success is determined by collaboration with investor networks in the face of equity-based crowdfunding campaigns.[34] Tapping into the increasingly important domain of crowdfunding—and financing of innovation more generally—this article gives unique insights into several attributes of founders and investors, and how these shape the startup's development and ultimate performance. In the context of open innovation, this article reveals the importance of working within networks—crowd networks in this case—which has important implications for startups, investors, and policymakers alike.

The article by Meulman, Reymen, Podoynitsyna, and Romme takes up yet another perspective on searching for partners in open innovation with an interest in how to overcome the constraints of local search.[35] Indeed, it is now a well-established fact that there are limits to search in the context of open innovation, for example, due to limited managerial attention. This is an important question because we need to acknowledge and better understand where the costs and limitations of open innovation lie, and this article highlights some of the challenges within local versus distant search. More specifically, this article is unique in that it develops and tests a tool that allows organizations to search for relevant open innovation partners based on keywords in relation to key roles and activities. This article illustrates how the tool, through network visualization and semantic algorithms, enables the identification of distant partners as well as overlooked local partners.

All in all, the articles in this Special Section on Open Innovation highlight a number of relevant aspects that tap into the current trends and challenges of open innovation, with implications for both research and practice. They show how both new and old organizations in both emerging and established industries can benefit from open innovation, while they also touch upon some of the costs and challenges of opening up the innovation process. They offer some useful concepts, tools, frameworks, and other findings that can inform future open innovation research, practice, and policy. In terms of open innovation, there are links to

open innovation facilitation and funding programs, while there are also implications for innovation dissemination, diffusion, and standardization—as in line with the European Commission's Three Opens: Open Innovation, Open Science, and Open to the World.

Future Outlook on the Open Innovation Research, Practice, and Policy

The Three Opens represents the basis for a new policy approach to innovation. It creates new institutional arrangements that connect openness in science (through public access journals and open data infrastructures) to open innovation (impacts of flows of data and new combinations of physical and digital knowledge and resources) to open to the world (global standards around open science, broader and faster dissemination, and eventually faster innovation). This approach appreciates the connections between each of the Three Opens, and promises a world of greater knowledge, more widely shared, for tomorrow's innovators.

The annual WOIC itself seeks to promote—by using this conference as a platform—this new approach to innovation policy. By connecting industry innovation practice more closely to the growing academic body of work on open innovation, the WOIC hopes to sustain high relevance in academic research, even as that research continues to thrive. Later WOIC events will move outside the United States, to Europe and elsewhere, as we pursue the vision of open innovation in the world.

Acknowledgments

We are extremely grateful to all our colleagues who helped to make the WOIC a success as well as to the participants who contributed with their academic papers, industry challenges, and overall a constructive attitude to help shape the contemporary understanding of open innovation. We would specifically like to thank Joel West, who helped shape the foundation of WOIC in general and who contributed to specific parts of the editorial process for this Special Section in *CMR*. This Special Section would moreover never have been possible without the great support and help of David Vogel, Kora Cypress, and the others at the *CMR* editorial office. With respect to this particular Editorial, we also gratefully acknowledge the invaluable help of António Vicente and Keith Sequeira in the Cabinet of Commissioner Moedas. More generally, we are indebted to all those academics, managers, and policymakers who have been willing to engage with us to explore the opportunities and barriers of open innovation. In the end, open innovation can only be a success if it is used in practice, and we hope to contribute with some perspective on how this may be best done in the future.

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Notes

1. D. Hilgers and C. Ihl, "Citizensourcing: Applying the Concept of Open Innovation to the Public Sector," *International Journal of Public Participation*, 4/1 (January 2010): 67-88.
2. I. Mergel and K. C. Desouza, "Implementing Open Innovation in the Public Sector: The Case of Challenge.gov," *Public Administration Review*, 73/6 (November/December 2013): 882-890.
3. M. Bogers et al., "The Open Innovation Research Landscape: Established Perspectives and Emerging Themes across Different Levels of Analysis," *Industry and Innovation*, 24/1 (2017): 8-40; H. Chesbrough and A. Di Minin, "Open Social Innovation," in *New Frontiers in Open Innovation*, ed. H. Chesbrough, W. Vanhaverbeke, and J. West (Oxford: Oxford University Press, 2014), pp. 3-28.
4. Commissioner Carlos Moedas has set three goals for EU research and innovation policy: Open Innovation, Open Science, and Open to the World. These three goals were first discussed by Commissioner Moedas in a speech in June 2015, accessed November 15, 2017, http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm, showing how research and innovation contribute across the political priorities of the European Commission. These goals do not represent a new policy initiative or funding program as such, but a way to reinforce existing programs such as Horizon 2020, and to reinvigorate existing policies such as the European Research Area. Accessed October 17, 2017. See also European Commission, *Open Innovation, Open Science, Open to the World: A Vision for Europe* (Brussels, Belgium: European Commission, 2016).
5. Accessed October 17, 2017, https://ec.europa.eu/research/openvision/index.cfm.
6. "*California Management Review* has served as a bridge of communication between academia and management practice for sixty years. With a history of publishing leading-edge research with managerial applications, *CMR* is uniquely positioned as both a valuable outlet for top business school faculty and an indispensable resource for practitioners." Accessed October 9, 2017. https://us.sagepub.com/en-us/nam/california-management-review/journal202706#description. This fits well with the focus of the World Open Innovation Conference (WOIC), which similarly seeks to connect the world of theory to that of practice in the domain of innovation studies.
7. H. Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology* (Boston, MA: Harvard Business School Press, 2003). The notion of "open innovation" was further specified in H. Chesbrough, "Open Innovation: A New Paradigm for Understanding Industrial Innovation," in *Open Innovation: Researching a New Paradigm*, ed. H. Chesbrough, W. Vanhaverbeke, and J. West (Oxford: Oxford University Press, 2006), pp. 1-12. The description of open innovation as we provide it here also draws in this original work.
8. H. Chesbrough and M. Bogers, "Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation," in *New Frontiers in Open Innovation*, ed. H. Chesbrough, W. Vanhaverbeke, and J. West (Oxford: Oxford University Press, 2014), pp. 3-28, quote from p. 17.
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13. A third type of open innovation that can be identified is a "coupled" mode of open innovation, which describes a combined form of inbound and outbound open innovation or another form of co-creations. This types of open innovation is discussed at some more length—as part of the larger open innovation model—in some recent publications: Chesbrough and Bogers, op. cit.; Enkel et al., op. cit.; F. T. Piller and J. West, "Firms, Users, and Innovation: An Interactive Model of Coupled Open Innovation," in *New Frontiers in Open Innovation*, ed. H. Chesbrough, W. Vanhaverbeke, and J. West (Oxford: Oxford University Press, 2014), pp. 29-49; M. A. Stanko, G. J. Fisher, and M. Bogers, "Under the Wide Umbrella of Open Innovation," *Journal of Product Innovation Management*, 34/4 (July 2017): 543-558.
14. An extensive review of this literature is provided in West and Bogers, "Leveraging External Sources of Innovation." Scholars keep a high interest in further exploring open innovation as also reflected by some of the more recent reviews on the topic: K. Randhawa, R. Wilden, and J. Hohberger, "A Bibliometric Review of Open Innovation: Setting a Research Agenda," *Journal of Product Innovation Management*, 33/6 (November 2016): 750-772; J. West and M. Bogers, "Open Innovation: Current Status and Research Opportunities," *Innovation: Organization & Management*, 19/1 (2017): 43-50.
15. F. A. Hayek, "The Use of Knowledge in Society," *American Economic Review*, 35/4 (September 1945): 519-530.
16. This notion is often labeled as *Joy's Law*, attributed to Sun Microsystems co-founder Bill Joy; see, for example, accessed October 17, 2017, https://en.wikipedia.org/wiki/Joy%27s_law_(management).
17. Chesbrough, Open Innovation: The New Imperative for Creating and Profiting from Technology; Chesbrough and Bogers, op. cit.
18. According to Chesbrough and Bogers, op. cit., p. 16, "These erosion factors are at the core of why open innovation reflects a paradigm shift as they challenge the basic assumptions, problems, solutions and methods for the research and practice of twenty-first century industrial innovation (cf. Kuhn, 1962)." T. S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 1962).
19. Parts of the following text draw heavily on some speeches by Carlos Moedas, including a Keynote Speech at the OECD on "Digitisation, Innovation Diffusion, Productivity Growth and a Renewed Policy Response," June 22, 2017, accessed October 17, 2017, https://ec.europa.eu/commission/commissioners/2014-2019/moedas/announcements/keynote-speech-oecd-digitisation-innovation-diffusion-productivity-growth-and-renewed-policy_en, and a Keynote Speech at the Word Open Innovation Conference (WOIC), Barcelona, December 16, 2016, accessed October 17, 2017, https://ec.europa.eu/commission/commissioners/2014-2019/moedas/announcements/woic-open-innovation-16-december-2016_en.
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27. M. Holgersson, O. Granstrand, and M. Bogers, "The Evolution of Intellectual Property Strategy in Innovation Ecosystems: Uncovering Complementary and Substitute Appropriability Regimes," *Long Range Planning* (forthcoming), doi:10.1016/j.lrp.2017.08.007; A. Radziwon, M. Bogers, and A. Bilberg, "Creating and Capturing Value in a Regional Innovation Ecosystem: A Study of How Manufacturing SMEs Develop Collaborative Solutions," *International Journal of Technology Management*, 75/1-4 (2017): 73-96; P. Ritala, V. Agouridas, D. Assimakopoulos, and O. Gies, "Value Creation and Capture Mechanisms in Innovation Ecosystems: A Comparative Case Study," *International Journal of Technology Management*, 63/3-4 (2013): 244-267.
28. A pilot phase of a European Innovation Council will involve a call to support innovations by SMEs with no predefined topics. This should break the silos in the way funding is typically attributed, give freedom to innovators to follow their own ideas, and provide society with more options to insure against uncertainty.
29. These numbers were drawn from Invest Europe (www.investeurope.eu).
30. The European Commission recently started a new program called Innovation Deals, which for now only focuses on circular economy projects. When an entrepreneur enters a heavily regulated field with a disruptive technology, it is important to create the platform for regulators, legislators, and entrepreneurs to meet and share the perception and the reality of the law at stake. This reduces uncertainty and avoids misconceptions that can set back an entrepreneur.
31. The Sustainable Development Goals (SDGs) are part of the 2030 Agenda for Sustainable Development, and were adopted by world leaders at a Summit of the United Nations (UN) in September 2015, see, accessed October 22, 2017, http://www.un.org/sustainabledevelopment/development-agenda. The 17 SDGs are (1) No Poverty; (2) Zero Hunger; (3) Good Health and Well-Being; (4) Quality Education; (5) Gender Equality; (6) Clean Water and Sanitation; (7) Affordable and Clean Energy; (8) Decent Work and Economic Growth; (9) Industry, Innovation, and Infrastructure; (10) Reduced Inequality; (11) Sustainable Cities and Communities; (12) Responsible Consumption and Production; (13) Climate Action; (14) Life below Water; (15) Life on Land; (16) Peace and Justice Strong Institutions; and (17) Partnerships for the Goals.
32. Coopetition describes an interorganizational relationship that combines "cooperation" and "competition," R.B. Bouncken, J. Gast, S. Kraus, and M. Bogers, "Coopetition: A Systematic Review, Synthesis, and Future Research Directions," *Review of Managerial Science*, 9/3 (March 2015): 577-601.
33. M. Cano-Kollmann, S. Awate, T. J. Hannigan, and R. Mudambi, "Burying the Hatchet for Catch-Up: Open Innovation among Industry Laggards in the Automotive Industry," *California Management Review*, 60/2 (Winter 2018): 17-42.
34. F. Di Pietro, A. Prencipe, and A. Majchrzak, "Crowd Equity Investors: An Underutilized Asset for Open Innovation in Startups," *California Management Review*, 60/2 (Winter 2018): 43-70.
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