Chapter 16
Redefining Collaborative Innovation in the Digital Economy

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Abstract The continuous growth of the digital economy is redefining the way innovative companies are collaborating with external partners. We analyze the case of the technology driven companies which are at the forefront of this evolution that impact both the inbound phase of the collaborative innovation, to get new ideas, knowledge as well as technology, and the outbound phase of commercialization and adoption of innovative products and services.

16.1 Introduction

With more than 3.2 billion people connected to the Internet, via computer or mobile device, in November 2015, the digital economy is now a fact of life and it keeps growing fast: the number of Internet users reached one billion in 2005, two billion in 2010, and three billion in 2014 (InternetLive stats 2015). Meanwhile an increasing amount of information, sometimes referred as "big data" is now available on the Internet. At the end of 2015, the total traffic over the Internet was close to one zettabyte, i.e. one billion gigabytes (Cisco 2016), while about 90% of the world's data has been generated in the past two years alone (Dragland 2013).

The digital economy is characterized by an increase in digitization of businesses and the intensification of e-commerce, as the new generation of Internet users is getting even more mobile, interaction and transaction. Another consequence of the digital economy has been the fast emergence of new players which have disrupted traditional business while reshaping markets, such as Amazon, Apple, Google and Facebook. In addition, many other lesser known digital companies, including private companies valued at $1 billion or more like Xiaomi, Palantir or Flipkart—commonly called "unicorns" (Fortune 2016) as well as a score of other well-funded start-ups have also disrupted traditional business. Bradley et al. (2015) have investigated the impact of digital disruption for 12 industries and 13 countries and

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have concluded that digital disruption will displace approximately 40% of incumbent companies within five years.

In such a fast moving digital environment, innovation has become a key priority for companies (Wagner et al. 2014). However, innovating is not an easy path to market success. One reason is that it is difficult to anticipate the market potential of an innovation as many inventions proceed to solve a specific problem but often turn out to have unexpected uses in unexpected conditions (Klein and Tornatzky 1982). Another cause is that very often, the impact of an innovation relies on complementary inventions, which contribute to a full system solution that will add to its performance and, consequently, its demand (Chesbrough and Teece 1996). An extra source of uncertainty is that development time for these complementary innovations can fluctuate very significantly (Viardot 2011).

But the failure to innovate is much riskier than the alternative of doing nothing while a successful innovation can be the source of a unique and sustainable differentiation which provides a competitive edge and generates significant profitability.

This is especially notable in technology driven industries such as telecommunications, electronics, or information technologies and services, where the pace of technology innovation is quite substantial. The Technology Products and Services sector is actually the first industry prone to be impacted by digital disruption but it is also the emblematic sector where innovation is the best way to attain success in the business.

In the latest survey done by the Boston Consulting Group (2015), four technology companies are cited as the top five most innovative companies by a poll of more than 1500 executives. Since the first edition of this survey in 2004, technologies constantly dominate the top-ten list. Apple has been number one every year since 2005 and Google has been number two every year since 2006. Microsoft has been in the top-ten every year since 2005 and has been joined by Samsung since 2013. IBM and Sony have also been in the top-ten nearly every year since 2005. Interestingly, in 2014 Facebook was listed for the first time as one of the most innovative companies which illustrate the accrued importance of the social technologies in the digital economy. Innovation has permitted to those companies and others to achieve a "winner-takes-all" position (Frick and Torres 2002) for a given innovative product category with a very dominant market share as illustrated in Table 16.1.

16.2 The Rise of Collaborative Innovation

An analysis of the various case studies shows that all those winning companies rely less on technology than on their marketing capacities to transform a successful idea into a product or a service which is valuable to customers (Viardot 2004). Among the marketing skills which those firms have developed, communication is extremely

Table 16.1 Dominant technology companies in selected innovative product categories[a] Year 2015

Product/service category	Market share(%)	Names of the dominant players
Operating systems (PC)	93.5	Microsoft
DRAM chips	93	Samsung, Hynix, Micron
Mainframe	90	IBM
Browser	90	Google, Microsoft, Mozilla
Social networks	88	Facebook, Google
PC microprocessors (notebooks)	82	Intel
Operating systems (Smart phones)	78.5	Android
PC microprocessors (desktops)	75	Intel
Relational database software	71	Oracle, IBM
Desktop search engine	69	Google
Chat application	69	WhatsApp, FbMessenger, QQMobile, Wechat
Wireless local area network (WLAN)	68	Cisco, Aruba
Servers	55	HP, Dell, IBM
Custom semiconductors	53.7	TSMC
Personal computer	51	Lenovo, HP, Dell
Tablets	42.5	Apple, Samsung

Source Companies annual reports, press releases, Bloomberg, IDC, Gartner group
[a]Companies are associated with its major successful innovation, even though the company may be diversified in other businesses. For example, Google is still closely related to web search engine, as Microsoft is with PC software, or Apple and Samsung with smartphones

important in order to create awareness for the new product in the market and to convince "early adopters" to buy the innovation (Frattini et al. 2013).

This ability to communicate externally has become even more fundamental as in the recent years, there has been a major paradigm shift in the innovation process with the rise of collaborative innovation (Baldwin and von Hippel 2009). In the past few years the proportion of large innovative firms that rely heavily on external support for innovation has increased dramatically because top executives believe that their organizations will no longer succeed alone when faced with the complexity of the world and they have to engage and collaborate with the external world system of customers, partners, governments and institutions (IBM 2011). A study about collaborative innovation in "Digital Europe" found that 62% of respondents are already making more than a quarter of their revenues through collaborative innovation (World Economic Forum 2015).

The logic of collaborating with customers and other partners to innovate is not particularly new, but the trend towards open innovation has been dramatically accelerated with the development of the digital economy technology, where

real-time communication fosters external and internal learning networks by establishing and enhancing the quantity and quality of communications (Inauen and Schenker-Wicki 2012).

Various studies have shown the value generating effects of integrating a broad range of external parties which are bringing a large range of resources, skills, as well as technical and commercial competences in the innovation process (Love and Roper 1999; Tether and Tajar 2008). Other works have underlined that companies relying on external parties have better innovation performance than endocentric companies (Miotti and Sachwald 2003; Nieto and Santamaría 2007). A recent research has also shown that companies that emphasize innovation are more likely to create radical innovations while firms pursuing closed innovation are more likely to exhibit a higher incremental product innovation performance (Bigliardi et al. 2012). When engaging in collaborative innovation companies look forward also to accelerating time to complete their research projects while mitigating the risks and reducing the costs per project.

In this chapter, we will detail how the collaborative innovation process is changing with the development of the digital economy. We will use the typology of Gassmann and Enkel (2004) which is built along the flows between a company and the many external innovation stakeholders. There is the "inbound" process where ideas, knowledge, and technology are obtained from the outside and brought into the company at the level of research and development of new solutions. There is the "outbound" process which refers to the external exploitation of the internal knowledge of a firm in order to develop or commercialize the innovation. Thus in the first part of this chapter we will analyze the recent evolution of the collaboration in the inbound innovation process of successful technology firms. Then we will examine the changes in the practice of collaboration for the outbound phase of innovation management.

16.3 The Impact of the Digital Economy on Collaboration in the Inbound Innovation Phase

The digital economy is drastically changing the way companies are collaborating with their environment for developing innovative solutions. Firms are now trying to pull all potential contributors to their innovation process in order to get new ideas, feedback or technologies. There is a wide variety of potential external partners available for companies which are looking to initiate collaborative innovation. They are the customers, the suppliers, the competitors, the universities the private research institutes, the government research organizations, the "complementors" that provide the product and services around the technology, the consultants, acting as carriers of the innovation or facilitators to the markets.

As the world requires greater levels of digital collaboration and cooperation among participants, the various partners have been increasingly organized into wide

and dynamic ecosystems around large technology companies. There is also an increasing interest to collaborate with young, dynamic, small start-up firms. Finally, the expansion of the collaboration goes beyond businesses with crowdsourcing which aims to enrol everyone in creating innovation.

16.3.1 The Ecosystem as the New Paradigm for Collaborative Innovation in the Digital Economy

Some companies are pushing aggressively the forming of an external innovation network with various partners in order not only to get new ideas but also to develop the products or services. Ecosystem innovation is made possible through digitally enabled platforms, which enable companies of all sizes to create, craft, develop and market new products and solutions. Constant feedbacks for improvement are constantly searched from the network participants and they are nurtured by a digital communication flow which is forcefully managed by the conducting firm. Moreover, the addition of more participants to a group creates an incentive for others to join in. Such a snowball effect may provide the necessary momentum to make an innovation successful enough to become a de facto standard and eliminate other competitive solutions.

Apple offers a good example of ecosystem innovation with its iTunes service or its iPhones. ITunes was launched in 1998 as a simple music player to support the iPod, an MP3 player, but over time it has developed into a sophisticated multimedia content manager available for all the Apple devices including the iPhone and the iPad with the collaboration of music artists, publishers, movies and TV shows producers, etc. Similarly, a large part of the success of the iPhone is based on the open innovation of millions of software applications developers. In July 2015, there were more than 1.5 million application software available for iPhone users (Statista 2015). In this innovating ecosystem, the collaborative innovation is symbiotic (Thomas and Wind 2013) as the partners, the application developers on one side and Apple on the other side, need each other to be successful.

Apple is not the only case in the technology industry. For instance, Microsoft, SAP, or IBM have made and forged entire ecosystems around their solutions, namely Windows, Hana, and Notes, with application developers, system integrators, trainers, and hardware companies working together to provide solutions to end users.

- The Microsoft Partner Ecosystem included about 640,000 partners including software developers, all types of distributors, telecommunication companies, and Internet hosting services. Microsoft is spending around more than USD 5 billion a year to manage such an ecosystem, including channel incentives, partner marketing business and investment fund. One of the first decision of the new CEO of Microsoft in 2015 has been to reemphasize the importance of a

collaborative ecosystem strategy for the company while playing down the intent made by his predecessor to grow a standalone phone business (Rubin 2015).

- SAP, the leader in ERP software for business-to business applications, had more than 13,300 partners all over the world in 2015—which the company describes as the SAP Ecosystem—working with and around its software solutions to offer an extensive range of industry specific solutions for its professional customers. In addition to its 14 Development centres known as SAP Labs and its 21 research locations worldwide, SAP has set up 13 Co-Innovation and Living Labs worldwide and it has invested in more than 130 Information Technology startups through its venture capital structure named Sapphire Ventures (SAP 2015)
- In the same line, IBM is now offering to its customers, business partners, regional government and academia to connect directly with its 13 worldwide IBM Collaborative Innovation Centers. Their role is to develop in-demand skills, to accelerate research innovations into markets and to drive economic development at regional level (IBM 2015).

Another innovation driven company, Samsung has recently decided to put the principles of Open Innovation into operation in addition to its existing overseas research centres. In July 2013, Samsung has opened its Open Innovation Centre (OIC) with 4 main activities: commercial partnerships with third party, investments in start-ups, acquisitions of small tech firms and innovation incubation with 2 accelerators in Palo Alto and New York City. The explicit objective of the OIC is to develop innovative software and services that touch the core software products that are on all Samsung flagship devices: phones, TVs, tablets, cameras (Penenberg 2015).

Another recent example of technologies companies which are actively nurturing an innovation ecosystem is Huawei. In May 2015 Huawei launched LiteOS, an operating system designed for running connected appliances and machines which is said to be 20% faster than other systems and which is open-source so that developers can modify the code and use it in a wide range of devices. Huawei is now actively working with domestic and overseas partners to make an ecosystem centred on LiteOS.

The development of the digital economy encouraged “open collaboration” which originated at the end of the 80s with the development of new “open source” application software such as Linux, Apache or Mozilla for instance. They were developed in a collaborative manner with a free access to an end product’s design and implementation details as well as a free redistribution. The success of “open-source” software was achieved by making the software architecture widely available for free, so that it could benefit from the value co-creation by the complementors, the customers and any other third party.

However, the “open-source” approach has also some limitations, especially regarding the full compatibility of new software versions over time. From a single software project emerged different versions of the original, because of the split between various development teams with no coordination or control. The most

famous example is the multiple versions of the original UNIX computer operating system which was developed in the 70s by AT&T's Bell Labs but is now sold in many different and often incompatible versions, including HP/UX, AIX (IBM), Berkeley BSD, SINIX (Siemens), Solaris (Sun), Inx (Silicon Graphics), etc. Consequently, an application developed originally for the UNIX market could run only on one of the versions and required a substantial adaptation to run on another version.

One key lesson from the "open source" software is that opening the innovation process does not guarantee the full compatibility of an innovation over time. It requires an aggressive stand from a company to make sure that this will happen and will last in order to make the innovation widely available to external parties who will adopt and fine-tune it.

16.3.2 Opening to Smaller Companies Young Dynamic Innovative Firms

The growing digital economy is also giving path to an accrued interest for large firms to collaborate with young companies in order to innovate more aggressively. Especially, young firms are frequently closer to new categories of users or potential users of novel products and services in growth-oriented markets. They are usually organized around the development of really innovative and potentially disruptive solutions. They can also experiment more rapidly than large firms allowing them to adapt more quickly to any change in customers' needs or desires. Conversely, recently established firms are habitually lacking the financial, marketing, and organizational resources required to scale their business and increase growth. So there is a sound rationale of collaborative innovation between large and small firms to make the most of their complementary proficiencies.

Traditionally there has been 3 ways for collaboration: Corporate venture, incubators (also known as accelerators) and joint innovation.

- **Corporate venture** is when a large firm—or its investment entity—invest equity into a privately held startup. This kind of collaboration is especially interesting for large firms which are willing to cut on the financial risk of betting only on internal research and/or which are looking for the next "cutting edge" technology or product innovation. Nearly half of the top 100 companies in the Fortune 500 ranking have a corporate venturing unit with Google Venture, Intel Capital, Qualcomm Ventures Salesforce venture and Comcast Ventures being the most active in 2015 in the US with investments in Internet, mobile and cybersecurity companies. About one-third of the total of corporate venture funds in the US are invested in digital companies (Global Corporate Venturing 2015).
- **Incubators** are fixed-term programs physically locating a start-up firm in one work space with many other start-up companies. Incubators are supporting start-up firms with consulting, mentoring, prototype creation and other services.

They are run independently by large companies or jointly with other actors such as universities or governments for example. Quite often, the start-ups in these incubators can be also venture funded by large companies at the same time. For example, the Microsoft Innovation Centers, present in over 100 locations worldwide, and embodying partnership with local government, universities and industry partners, are incorporated within Microsoft Ventures. They offer three years of free software, developer tools and free Cloud Services.

- Recently incubators have been completed with startup "**accelerators**" which are quite similar but with some distinct differences as the goal is to help to jump start a business as fast as possible (Deering et al. 2014) while there is no time limit for a company to stay in an incubator. The time in an incubator space is typically limited to 3–4 months and the cash investment from the accelerator itself is very minimal compared to an incubator. The main benefit of an accelerator is to improve the chances of raising venture capital from a third-party entity after graduating from the program, as the best accelerators significant educational and mentorship programs that culminate in a demo day (Solomon 2015).
- **Joint innovation** or co-creation is defined as an agreement between a large firm and one or many partners to work together for the development and/or the marketing of a common and new product, service or technology. It may take the form of development funding, development of new Intellectual Property (IP), purchasing agreement. Joint innovation usually covers a specific part of the innovation lifecycle (ideation, prototyping, development, production and commercialization) and usually requires allocation of resources limited to a project scope.

But the digital economy is reshaping the way large and small firms are collaborating for innovation as illustrated by a recent survey from Accenture (2015) about the status of the previously mentioned three types of relationships in 2015 and in the next 3 years both for large companies and young start-ups.

Corporate venturing is losing its top spot for large firms as the number of companies relying on it will be cut by half between 2015 and 2018, from 36% of users to 19%. While corporate venturing comes only second for start-ups in 2015, it will also lose its appeal in the same proportion with only 13% of entrepreneurs considering it as important in 2018 against 23% in 2015. The relative status of incubators will stay almost the same for large firms as 34% consider them as important in 2015 and 36% believe they will still have an essential role in 2017 for collaborative innovation. In parallel, a growing number of small firms expect that incubators will play an important role from 19% in 2015 to 25% in 2018, indicating that startups are still looking for all the supportive services that provide effective incubators and accelerators as a means of progress towards joint innovation.

But the most significant shift is in the evaluation of the importance of Joint Innovation as a way to collaborate with external partners for getting new technology, skills, talent and resources. The use of Joint Innovation will grow by 50% between 2015 and 2018 regarding large companies as the share of firms actively

involved will reach 38% in 2018 from 26% in 2015. In parallel, start-ups are also considering increasing their involvement in Joint Innovation from 26% in 2015 to 36% in 2018, representing a rise of 38% (Fig. 16.1).

While such a development of collaborative innovation is emblematic of the need from more co-operation for innovation between large and small firms, it does not come that easy because of different organization, practice and culture. While small startups are more prone to disruptive innovations with a fast prototyping and a quick market probing, big companies tend to prefer incremental innovations with a longer sequential "gate stage" prototyping and selection process, and a structured and slower route to market implementation along their distribution channels. In terms of organizations, startups are usually flat, informal, decentralized and risk oriented while established firms have a tendency to be hierarchical, more formal in terms of communication and decision-making, centralized and risk averse. When considering the investment in any innovation project, young startups are obviously considering first the short-term impact on the free cash flow while the large companies are sensitive to the Net Present Value (NPV) over the long term.

Added to the challenges coming from those structural imbalances is the difference in perceived commitments from each of the 2 parties in Joint Innovation. According to the same survey by Accenture, 29% of small startups were considering that their bigger partner was not committed to the collaboration while only 7% of the largest firms were thinking the same from their smaller partner. Conversely, only 24% of the small firms were confident that their larger partner was very

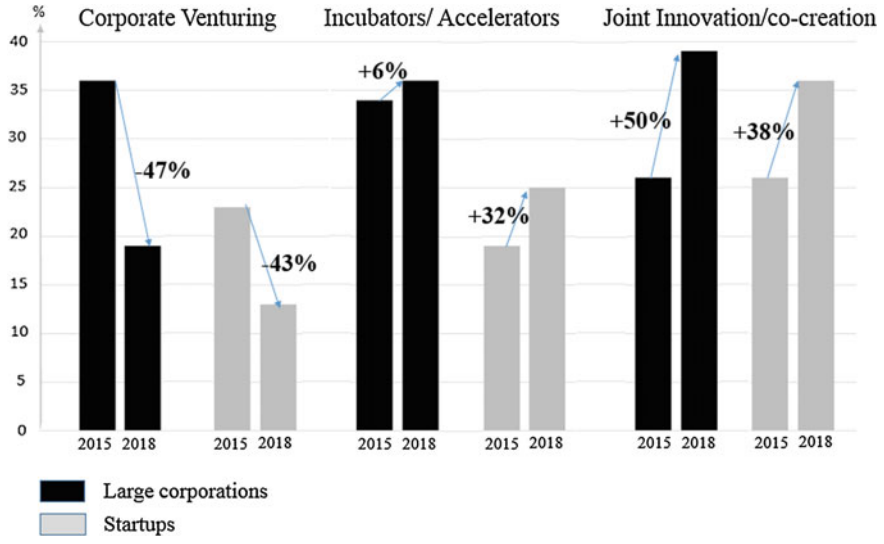

Fig. 16.1 Evolution of the percentage of companies considering the importance of the three major tools for collaborative innovation between 2015 and 2018. *Source* Accenture (2015)

committed while 41% of large firms were thinking the same about their smaller associate.

In order to overstep those potential roadblocks, there are 3 important steps to follow in order to set up a successful collaborative innovation between large and small firms particularly in the digital economy: The first one is to make a thorough preparation, both internally and in the selection of the potential partner. The second phase is to carefully craft the partnership, and the last stage is to ensure the sustainability of the collaboration for innovation.

The **preparation** phase is often critical for the future success of a C collaborative innovation I initiative but it is often overlooked by companies, large or small. It starts with a clear delineation of the objectives of the future collaborative innovation project answering questions such as: which area of innovation do we want to reach? Which technology? How the collaboration will contribute to our corporate strategy? Is collaboration better than a mere acquisition?

Another important element is preparing the organization to support in terms of structure, culture and incentives. A key element of collaborative innovation is the rapid and continuous flow of information from the company to the partner. This cannot happen in a structure with a defensive structure prone to defend only internal ideas; similarly a complex decision making process—either because it is too hierarchical or too much consensus-based can slow up the communication and frustrate a more agile partner. Also, it is very common for incentives to be modified in order to reward collaborative mindset, risk taking mentality, entrepreneurial attitude, while cross-organizational and cross-functional teams have to be set up.

The ultimate element of the preparation phase to collaborative innovation is the selection of the adequate partner. The scouting for future partner can be made through network events and conferences but also via the publication of innovation needs in offline or digital industrial and business media or directly over the Internet. For example, the Technology to Business (TTB) unit of Siemens looks for the best sited partners by allowing young firms through to answer a questionnaire and submitting their proposal on the website. TTB also monitors potential partners at global levels with the use of web databases.

There are also now dedicated matching platforms to search and partner, such as Spotfolio, based on a semantic web search, where businesses can select the technologies, products and services of their interest, and then access information on companies matching these criteria (Spotfolio 2016).

Once the partner has been selected, another key factor for the success of the collaboration is the crafting of an agreement mutually beneficial to both parties. This is because partnering for innovation encompasses a higher level of uncertainty and a longer timeline than the typical collaboration project between different companies. Here the firms involved must adequately define the benefits, risks and governance aspects of the collaborative innovation project.

The most important element in a collaborative innovation project in the digital economy is probably the issue of Intellectual Property (IP) rights where there is very often a huge gap between start-ups and large firms in terms of know-how and resources. IP rights are at the heart of collaborative innovation in technology

industries as very often companies bring existing IP to the collaboration or will develop new IP through the partnership. Therefore, it is fundamental to have agreement in advance about the exact use and protection of IP to build a relationship based on trust in order to extract the full value of collaboration. More specifically large firms have to be careful not to dodge too much the IP of innovative start-ups because they may refrain to team up and thus jeopardize the future of the innovation partnership. They have to be prepared to accept not to have the full-ownership and control of IP.

Large firms also have to pay attention to be flexible enough in term of control, legal compliances or due diligence in order to keep younger and faster startups motivated. Conversely small firms have to be ready to pay for legal and expert advice at the same level as a large firm and to finance significant upfront IP protection costs. They must also be able to enlarge their timeframe when negotiating with a bigger partner.

The availability of a common platform for sharing and diffusing innovation can also be important to facilitate the access to new and smaller companies to join the innovation ecosystem of a larger partner, as seen previously. But in some cases the collaboration is more than digital and may entice a physical infrastructure like AT&T Foundry or the Verizon Innovation Center to allow start-ups to test their proof of concepts in reality.

The final step to ensure a fruitful CI is to sustain the partnership overtime to achieve a continuous benefit of mutual parties as the context evolves. This is not a small feat to achieve as we have underlined the physical and cultural differences between small and large firms regarding the management of innovation, in the unstable environment of the digital economy.

In order for collaborative innovation to succeed in the long term, experience shows that firms, large and small, have to:

- share knowledge and integrate the results systematically across their product lines,
- develop ongoing mutual benefits and safeguarding incremental IP in a transparent manner,
- incentivizing team and employee support for collaboration with external partners
- make sure that lines of communication are always functioning between partners
- honest assessing of the challenges and risks of failure for the future (World Economic Forum 2015).

In some cases, it may imply to manage the partnership outside the sales organization so that collaborative innovation outputs may blossom without being subject to short-term business demands.

The building of an ecosystem of external innovators is based on the setting of strong ties which involve a strong degree of trust and are characterized by frequent contacts over a longer period. Those interpersonal ties that are built through frequent communication can lead to more effective interactions (Uzzi 1997) but

conversely they may provide redundant information, especially as they occur among a small group of people in which almost everyone knows what the others know. That is the reason why some firms are also trying to enlarge their reach of innovation contributors far outside their regular business environment in getting ideas from everyone with crowdsourcing.

16.3.3 The Expansion of the Ecosystem to Everyone: Crowdsourcing

Crowdsourcing can be defined as outsourcing a task in the problem solving process to an informal group of people, and not a designated agent in the form of an open call to contribution (Afuah and Tucci 2012).

Based on crowdsourcing principles and using the reward structures of tournaments (Morgan and Wang 2010), a challenge is posted to a large public and the contributions are evaluated by a jury to select and reward the winning ideas. For instance, Cisco has launched an external innovation competition called the I-Prize to help the company identify promising business platforms for future growth and with a prize of $250,000 prize for the winner (Jouret 2009). Dell is using a website called IdeaStorm where customers can submit ideas to improve the company's products or services and vote on the ideas of others. Since its launching in 2007 this platform has dealt with more than 24,000 customer ideas and had implemented 549 ideas by February 2016 (Dell 2016).

Crowdsourcing has been used since a long time with the Longitude Prize offered by the British government in 1714 to anyone able to design a method to measure a ship's longitude (Dawson and Bynghall 2012). But the recent rise of crowdsourcing as a tool for innovative collaboration is directly related to the development of the digital economy as crowdsourcing as well as the rise of the Internet and the social applications is tremendously easing the way for companies to engage and collaborate with mainstream users or contributors by posting their call for ideas on line (Bilgram 2013).

The key benefit of crowdsourcing is to reach out to an undefined mass and a wider variety of user types than the traditional external partners; it provides a more heterogeneous background favourable to highly creative and "out of the book" suggestions, with a more heterogeneous background favourable to highly creative and "out of the book" suggestions. Furthermore, crowdsourcing is based on mostly weak ties with the participants of the network which are built on loose emotional tendencies and are maintained via infrequent communication. This kind of relationship is considered to increase the probability of stimulating creativity because they bridge otherwise disconnected groups and individuals (Tsai 2001), they are providing access to original information (Granovetter 1973), and they encourage autonomous thinking (Perry-Smith 2006).

The effective way of using crowdsourcing for collaborative innovation requires first to be able to design a contribution structure that allows for large participatory efforts while respecting the diversity of opinions (Seltzer and Mahmoudi 2013). Second, it necessitates the capacity to capture the valuable contribution from heterogeneous individuals or group of participants (Howes 2008). As a consequence, the digital platform which supports crowdsourcing is very important with its look and feel in order to make it easy to use but also with the rules for participation and interaction among the participants. Zhao and Zhu (2014) have shown that the platforms are enablers and drivers for extracting the maximum value of the open calls. With the constant evolution of digital technology, those platforms are getting increasingly more efficient in mediating the relationship between a firm issuing a call and the multitude of contestants.

The use of crowdsourcing is not yet widely used by companies compared to other sources of open innovation but it is slowly making its way (Chesbrough and Brunswick 2013). This is notably due to the limitation in time and scope of the contribution from crowdsourcing. But a recent study by Xu et al. (2015) showed that Chinese firms in the telecommunication industry which use outsourcing technologies to capture the knowledge of the customers and transform it in innovation competences, can obtain a significant advantage in business performance compared to their competitors.

In recent years, private companies are also using specialized platform to externalize crowdsourcing such as Ideaken, which is specialized in open innovation, or Zoopa where companies can launch advertising contests.

16.4 The Impact of the Digital Economy on Collaboration in the Outbound Innovation Phase

It is not enough to have good new ideas: first and foremost, an innovation must be adopted by the market. Without market success, it is just a useless invention whose failure will dent the profitability of the vendor or may even lead it to bankruptcy. Still a large percentage of innovations are still failing to be successful in the market and to be profitable (Castellion and Markham 2013). The outbound activities of the innovation process have become significant priorities for companies especially in the technology sector.

The adoption of innovation follows the S-curve defined by Bass et al. (2004) when considering the number of users over time. The shape of the curve is determined by the limited number of *early adopters* of an innovation which reaches a tipping point where there is an acceleration of the adoption of the innovation by an *early majority* of *mainstream adopters* followed by a *late majority* up to a tripping point where the innovation is now massively adopted and starts plateauing. Early adopters and the majority of adopters have different expectations when it comes to adopting an innovation.

Early adopters are focusing on performance, the technical credibility of a provider and the quality of the innovation. Also known as "lead users", they are often ready to contribute to work with the provider to test the innovation and to improve it. Early adopters have also been shown to not be very sensitive to the price of an innovation. They are much more sensitive to delayed market introduction and may be less tolerant if the providers fail to deliver on time an innovation that has been announced.

Mainstream innovation adopters are the ones who can break or make an innovation because they represent the biggest number of potential customers. The significant failure rate of market acceptance of innovations reflects the difficulty that some companies have to convince the mainstream adopters to adopt an innovation. They are very sensitive to the credibility of the innovation provider and the quality of the solution because they are looking more for safety than performance. They also prefer easy-of-use innovation and consider the organizational and technical infrastructure that exists to support the use of the innovation. They also follow the social influence of peers and "opinion leaders" who recommend a particular innovation or technology. They also pay a lot of attention to the reliability of the vendor as they do not want to spend money or time with the repair of a potentially poor solution. Consequently, they prefer to go with innovation which has already been recognized as a kind of standard reference. Also, they go with vendors which already have an established brand and a good reputation in order to minimize the risk of malfunction.

In order to facilitate the adoption of innovation, successful companies have figured out that it was important to work well with the early adopters in order to achieve a critical mass of users able to convince a larger majority of the value of the innovation. Those firms had also understood the importance of setting up strong technology standards and developing a solid brand image to attract and convince the majority of users to adopt an innovation.

But the digital economy has also redefined and changed how innovative companies are collaborating in the commercialization phase of the innovation process. More specifically, it concerns first the new interaction with early adopters through crowdsourcing, second the accrued role of a new category of "enabling" standards, and finally the renewed importance of branding.

16.5 A More Intense Collaboration with Early Adopters: Crowdfunding

Among the early adopters, the "lead users" have always played an essential role on accelerating the diffusion of an innovation (Salah et al. 2010). Lead users are dissatisfied users ahead of the market trends who are willing to develop their own solutions or to collaborate with the provider (Franke and Piller 2003) because they enjoy the problem-solving techniques (Bilgram et al. 2008). Some innovative

companies have managed to develop a "toolkit approach" (von Hippel and Katz 2002) that transfers most of the product and service development tasks from the research and development department to pre-qualified lead users (Piller and Walcher 2006) which are participating directly in most of the stages of the product development process (Prűg and Schreier 2006). Such a method facilitates the development of new products that are accepted by the market (Henkel and von Hippel 2005).

Actually, lead user contributes to an accelerated rate of diffusion in comparison with the traditional internal innovation method (van Oast et al. 2009) with acceptance performance superior to any other external agents including the external product development partners (Al-Zu'bi and Tsinopoulos 2012). One of the reasons is that lead users are also powerful evangelizers and opinion leaders in their industry. Being among the first adopters of new products, they represent a reliable source of information and their word-of-mouth power is strong enough to influence the behaviour of other people in terms of search, purchasing and usage of new products (Goldsmith et al. 2003).

A recent and even more intimate way to associate lead users to innovation comes with the development of crowdfunding, which allows the general public to invest investment in businesses through a dedicated website. In 2015, crowdfunding had surpassed Venture Capital as a way to finance innovation with a total of $34.4 billion invested against $30 billion with the US leading the way before Asia and Europe: while crowdfunding can be applied to any cause, business and entrepreneurship are the most popular categories ahead of social causes. The most famous crowdfunding sites include Kickstarter and Indiegogo for instance but in 2016 there were more than 1250 active platforms in the world (Massolution 2015) with technology dedicated platform such as Appbackr, a crowdfunding site for application developers. Crowdfunding is now strongly established as a new way for collaborative innovation as Mollick and Kuppuswamy (2014) have found that 90% of the projects funded on Kickstater remained active companies 4 years after their (reward-based) campaign while 32% of them had yearly revenues of over $100,000.

They are two main forms of crowdsourcing: the "All or Nothing", where no money is collected if the pre-announced amount of money pledged is not achieved, and the "Keep it All", where the money is handed over anyway for the project. The most popular model is the reward-based crowdfunding where providers received rewards such as the products created, personalized incentives, copies of a creative work, or promotional products, etc. Other models are relying on donations, lending (debt crowdfunding), or equity in the company (equity crowdfunding). Finally, a donation can be made once or continuously if the content is delivered on a regular basis such as Bountysource, another crowdfunding site for open-source developers, which is accepting one-time or monthly donations (Bountysource 2016).

Crowdfunding is naturally a type of crowdsourcing (see above) as it allows the company to get additional ideas from its fund providers for developing the product or service as well as the opportunity to test prototypes directly with crowdfunders. But crowdfunding is also a very effective way to enhance the commercial application of collaborative innovation because the crowdfunders are usually the first to

buy the new product they have supported either because they believe in the idea or the product or because they receive it as part of the reward. It allows the subscribing companies to use their fund providers as early customers to who they can presell their products or services, which are often non-existing yet. Beyond the assistance in the (pre)-commercialization phase, the crowdfunders are also usually contributing actively to the diffusion of the new offer through an enthusiastic and positive word-of-mouth campaign among their network, and especially their digital network communities. With such a backing some projects have received millions of dollars in crowdfunding, the most famous being "Star Citizen" a space combat video game which is the first crowdfunded project to have received more than $100 million and which should be launched in 2016 after 4 years of development (Cieslak 2016).

16.6 The Accrued Role of a New Category of "Enabling" Standards

Standards have always played an important role in facilitating the acceptance and the diffusion of an innovation, especially among the late majority of adopters as well as the late adopters because they represent a guarantee of quality. They make life easier to the customers who know that they are buying a solution which has been acknowledged by the majority of the vendors within an official standard committee, often with the backing of national and/or international governments and administrations. In some cases, the "dominant design" which is recognized as a standard is not coming from a committee but from a powerful company which has managed to turn its innovation into a de facto market standard, such as Microsoft with Windows, Google with its eponym web search engine, or Sony with its Blu-Ray technology. But for the users, the results are the same: they are sure that they are buying a solid and stable solution with proven facilitating conditions of use and support. Standards perform the fundamental functions of quality assurance, information and measurement, and they contribute to the prevention of the occurrence of a risk and/or to the reduction of a potential loss should a risk materialize. In telecommunication for instance, standards reduce the managerial and financial risks in joint venture and mergers or in acquisitions of networks (Sherif 2006).

In the technology sector, the need for standards has always been reinforced by the need for compatibility between different categories of equipment and service suppliers. For instance, in the computer industry, compatibility is required to ensure that computers, software, modems, printers and other peripherals interface easily. Similarly, in the mobile telecommunications market, compatibility demands a common set of technological standards for the design of cellular base stations, digital switches and handsets to ensure maximum geographical coverage for users.

Traditionally, the discussions about compatibility have taken place in the various standardization committees like the International Telecommunication Union (ITU),

the Institute of Electrical and Electronics Engineers (IEEE), or the European Telecommunications Standards Institute (ETSI). This compatibility approach was very effective when the market was mostly dominated by the large suppliers. For instance in the 90s the European mobile telecom vendors and operators companies managed to agree on one compatible technology, the Global System for Mobile Communications (GSM) developed by the ETSI while there were four different and non-compatible technologies in the US. The value for the cellular phone users clearly was much bigger in Europe than in the US and the cellular phone caught on more quickly in Europe than in the US. The GSM can be described as "anticipatory" standards which is looking forward to solve interoperability and compatibility issues. It is usually opposed to the "responsive" standard which comes at the end of the technology development and which officializes a dominant design of a product or service.

Between those two categories, the pressing need for more collaborative innovation in the digital economy is pushing for the development of "enabling" standards (Egyedy and Sherif 2010) to facilitate the surge of acceptance of an innovation. Actually, once an innovation has passed the initial acceptance of early users and is looking for the early majority of adopters, there is a risk of fragmentation of the offer: This is because new competitors, enticed by market growth and improvement in the innovation, may enter the business and offer alternative solutions based on another technology. Such a fragmentation is denting the credibility of the innovation vendors because different competing technologies or solutions are confusing the prospective early majority of adopters. Accordingly, they prefer to wait for a dominant model to emerge before making a decision. Additionally, market fragmentation prevents economy of scale and the associated decrease of production costs which cannot be translated in the price. As the late majority of adopters are sensitive to price this is another limitation to the adoption of an innovation. Finally enabling standards signal to the customer that competition is shifting to areas that are not covered by the standard (cost, quality of implementation, service support, etc.).

Thus in the context of open, collaborative innovation, large companies are pushing for "enabling standards" which support the offer around a common set of characteristics in order to contribute to the emergence of a prevailing model of product or service and to prevent the fragmentation of the market. But those enabling standards are dynamics because they integrate the feedback from the market as they are influenced by competitive forces and the need to reduce production costs. An interesting illustration is the HyperText Markup Language a.k.a. HTML, which is the standard language used to create web pages. It was originally created in 1990 by T. Berners-Lee which moved it to the World Wide Web Consortium (W3C), the main international standards organization for the World Wide Web. Since that time HTML has been continually evolving with technology and the market and it is currently in its fifth version while being the most adopted solution for designing web page application for computers and mobiles.

Enabling standards are by definition flexible standards as opposed to the rigidity and uniformity which is associated with responsive standards. Enabling standards

demonstrate that consensus-based standards do not necessarily mean rigidity because they encourage collaboration as well (Choi et al. 2011), and that standardization is also a powerful way to enforce the acceptance of an innovation (Viardot et al. 2016). Actually, open collaboration with other partners has been positively correlated with the proclivity to join standardization activities (Blind et al. 2012).

16.7 The Renewed Importance of the Brand Image

The running of collaborative innovation in the digital economy has also reinforced the importance for a company to have a strong brand image and to communicate it forcefully and effectively outside in order to rally the maximum of external parties around an innovation (Corkindale and Belder 2009).

Actually, a major issue for the adoption of an innovation is the anxiety of the majority of customers, developers or external parties in front of the uncertainties of any novelty (Boyd and Mason 1999). Some are intimidated by the task of learning how to use the innovation, some are risk averse to any novelty, and others are afraid that the innovation will become obsolete quickly; all are always postponing their decision to take it on. What is true for consumers is also true for organizations. Many managers fret about innovations and try to assess the balance on the risk/return relationship of such investment more than considering the sheer novelty of an innovation.

Consequently, a well-known and familiar brand helps to reassure individuals or industrial buyers when they consider the purchase of an innovative solution which represents always a leap into the unknown. In that case, one of the main criteria that determines a customer's choice is confidence in a company and its products (Temporal and Lee 2000).

A brand is a name, a set of words, a sign, a symbol, a design, or a combination that identifies a seller's goods or services (Keller 1993). A strong brand facilitates the identification of the innovation while attaching a quality image and a personality that establish a bond with the customers and facilitate their loyalty (Urde 1999). For instance, Google is perceived as a clean, friendly but credible path to accessing the tremendous wealth of the Internet. Cisco's image is associated with being a visionary and an expert in Internet telecommunication as well as a partner with its clients. Huawei, its Chinese competitor has managed to carve out an image of being extremely innovative at the global level. And the Apple brand personality is about lifestyle, imagination, innovation, passion, and aspirations. It suggests also power-to-the-people through innovation thanks to simplicity and the removal of complexity from people's lives (Marketingminds 2013).

Successful technology companies which are relying on collaboration for innovation have also invested in the building of a strong brand, which has put them on the top of the rankings of the most valuable brand in the world in 2015, ahead of more traditional sectors. As illustrated in Table 16.2, 15 technology corporate

Table 16.2 Different rankings of the top most valuable marketing brands in 2015

Company	Value ($M)	Industry	Millward Brown[a]	Forbes[b]	Interbrand[c]
Apple	247.0	Technology	1	1	1
Google	173.7	Technology	2	3	2
Microsoft	115.5	Technology	3	2	4
IBM	94.0	Technology	4	5	5
Visa	*92.0*	*Payments*	*5*		
AT&T	89.5	Telecom provider	6	12	
Verizon	86.0	Telecom provider	7	21	
Coca Cola	*83.8*	*Soft drinks*	*8*	*4*	*3*
McDonalds	*81.2*	*Fast food*	*9*		*9*
Malboro	*80.4*	*Tobacco*	*10*		
Tencent	76.6	Technology	11		
Facebook	71.1	Technology	12	10	23
AlibabaGroup	66.4	Retail online	13		
Amazon	62.3	Retail online	14	13	10
China Mobile	59.9	Telecom provider	15		
Wells Fargo	*59.3*	*Regional banks*	*16*		
GE	59.3	Conglomerate	17	9	8
UPS	*34.1*	*Logistics*	*18*		
Disney	*43.0*	*Entertainment*	*19*	*11*	*13*
MasterCard	*40.2*	*Payments*	*20*		
Baidu	40.0	Technology	21		
ICBC	*38.8*	*Regional banks*	*22*		
Vodafone	38.5	Telecom provider	23		
SAP	38.2	Technology	24		
American Express	*38.1*	*Payments*	*25*	*22*	*25*
Samsung	37.9	Technology		7	7
Toyota	*37.8*	*Automotive*		*8*	*6*
Louis Vuitton	*28.1*	*Luxury*		*14*	*20*
Cisco	27.6	Technology		15	15
BMW	*27.5*	*Automotive*		*16*	*11*
Oracle	26.8	Technology		17	16
NIKE	*26.3*	*Apparel*		*18*	*17*
Intel	25.8	Technology		19	14

(continued)

Table 16.2 (continued)

Company	Value ($M)	Industry	Millward Brown[a]	Forbes[b]	Interbrand[c]
Walmart	*24.7*	*Retail*		*20*	
Honda	*22.6*	*Automotive*		*23*	*19*
Mercedes-Benz	*22.5*	*Automotive*		*24*	*12*
Budweiser	*22.3*	*Beverages*		*25*	
HP	23	Technology			18

Brand value represents the fractions of intangible corporate earnings of a company which is attributable to the brand multiplied by an earnings multiple, depending on the brand market valuation and the brand growth

Source [a]http://www.millwardbrown.com/BrandZ/2015/Global/2015_BrandZ_Top100_Chart.pdf
[b]www.forbes.com/powerful-brands/list
[c]http://interbrand.com/best-brands/best-global-brands/2015/

brands dominates the top of the ranking by MillwardBrown with a brand value in a range of $37.8M to $247M. Two other rankings by Forbes and Interbrand come with a slightly different order but the overall result is that technology brand dominates the branding panorama.

This preeminent position of innovation driven brands does not come by accident. One may argue that their value reflects their market success. Actually part of their hit performance has been achieved through a strong forceful branding strategy which they have started very early in their corporate life.

Some of the companies listed in the ranking above certainly are now spending huge amounts of money to promote their brand. For example, in 2014 Samsung spent a total of $14 billion on marketing, the biggest marketing budget ever, bigger than Iceland GNP (Miyoung 2013) but scaled it down the following year. In 2015, Microsoft spent almost US$2 billion, while Apple devoted US$1.6 billion, in advertising.

But the building of a strong brand image for an innovation does not always require big amounts of money. Some highly successful innovative companies have managed to achieve recognition essentially through creativity, quality and word-of-mouth. In the 80s many successful innovators such as Intel, Microsoft, Compaq, Cisco, and others were first mentioned in the pages of the Wall Street Journal, the Financial Times, Business Week, Forbes and Fortune magazines. Only once their brand image was made, then they spent money in advertising to maintain their image and notoriety. More recently in the 2000s, a new generation of web-based firms such as Google, EBay, Amazon, Apple or Facebook also achieved top of mind recognition on a low advertising budget and by generating "buzz" over the Internet. Now than they have matured, they are also relying on larger and more expensive traditional marketing campaigns. It is now to a new generation of "companies—such as Snapchat, Okta or MongoDB—to generate excitement and passion over social networks and the web in hope that this will transform into sales afterwards.

Collaborative innovation provides additional ways to enhance brand awareness and brand image, such as developing and tightening deep relationships when hundreds of consumers spend significant amounts of time interacting with companies and their brands on idea contest platforms (Nambisan and Nambisan 2008). Furthermore, consumers share their experiences with a brand over the social network and spread positive word-of-mouth in their networks extending the reach of simple open collaboration platforms or initiatives (Füller et al. 2010). For instance, Microsoft has created the **Imagine** Cup to give the opportunity for students to turn their ideas into reality, as well as to solve challenges and problems provided to them. On average, more than 165,000 students are participating every year.

When promoting an innovation, the use of branding is not exclusive to private companies. It has been used very effectively by some alliances to promote an innovation in order to make it a standard. Take for an example HDMI, a compact audio/video interface which was initiated in 2002 by a handful of companies, and has now over than 1700 adopters (HDMI 2013). Another successful example is Bluetooth, a short-range networking protocol for connecting different types of digital devices (mobile phone, computer, GPS, etc.) or accessing the Internet by wireless signals within a 35-ft or 10-m range. In 1998, five companies founded the Bluetooth Special Interest Group (SIG), Ericsson, IBM Corporation, Intel Corporation, Nokia and Toshiba Corporation. Its goal was to promote the development of the new protocol as the standard solution for wireless connections. In the early stages the decision was made to develop a strong brand so as to communicate with the end consumers in order to accelerate its recognition and to step up its adoption by other industrial companies. Today, the Bluetooth SIG has more than 25,000 member companies in 2014 (Bluetooth.org 2014).

16.8 Conclusion

In this chapter, we have analyzed how the digital economy is redefining the strategy of open collaboration of innovative companies both in the inbound and outbound part of the innovation process. Though we have used different examples, the reality is that successful innovative companies in the technology sector are coupling the two processes—inbound and outbound—when working with external partners. An interesting illustration is the case of SAP which is also relying on crowdsourcing with programs such as the SAP HANA Idea Incubator and the SAP Idea Place to facilitate collaborative inbound innovation, in addition to its SAP Labs, its Co-Innovation Labs and its venture capital units that we have presented in 1.1. While on the outbound side of innovation, SAP is not directly involved in crowdfunding projects because of its size and the nature of its business (including its industrial customers), but it has developed its own set of sixteen flexible standards for key operations processes to guarantee a better use of its solution operations. Finally, in 2015, SAP has made the major decision to rebrand all the

companies acquired under the unified SAP Brand which represent the underlying innovations and integration that SAP offers to its customers.

Collaborative innovation does not come automatically and requires an effective management because collaborative innovation is redesigning completely the flows of information—and power—inside the company. As illustrated with the case of innovative companies from the technology sector, collaborative communication leads to the emergence of a new category of managers, called the "network orchestrators" (Fung et al. 2007) who are able to deal with a large diversity of contributors. They have to develop a specific set of management skill, because their role is not the same as managing internal collaboration. It requires a more fluid approach with a network-centric perspective and not only a firm or a market centric viewpoint. Network orchestrators must also have considerable communication skills and they must be able to communicate clearly, simply, effectively and consistently with all innovation partners in order to identify, and then keep them motivated and engaged (Thomas and Wind 2013).

Finally in the globalized word of technology, the digitalization of the economy is also turning internationalization as a new key success factor with collaborative innovation. **Innovative technology companies are increasingly going abroad to interact with their most demanding customers and locating the most competent or lowest priced suppliers. They are also seeking ideas or knowledge with leading research environments which are getting more geographically dispersed and searching for new markets for their technologies** while promoting their brand at a global level. **Consequently, the proportion of corporate R&D centres performed outside domestic countries is increasing rapidly** (Herstad et al. 2008) *while some companies are even relocating their headquarters in order to be more collaborative, such as* SAP which has moved the R&D head office to the Silicon Valley in the US. Of particular interest is the growing presence of Chinese and Indian innovative technology companies—including Alibaba, Huawei, TCS or Infosys among many others—which have managed to increase significantly their business outside of their native countries in recent years. There is no doubt that globalization is clearly the current challenge for companies which want to develop collaborative innovation in the digital economy.

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