

Regional Agenda

Collaborative Innovation Transforming Business, Driving Growth

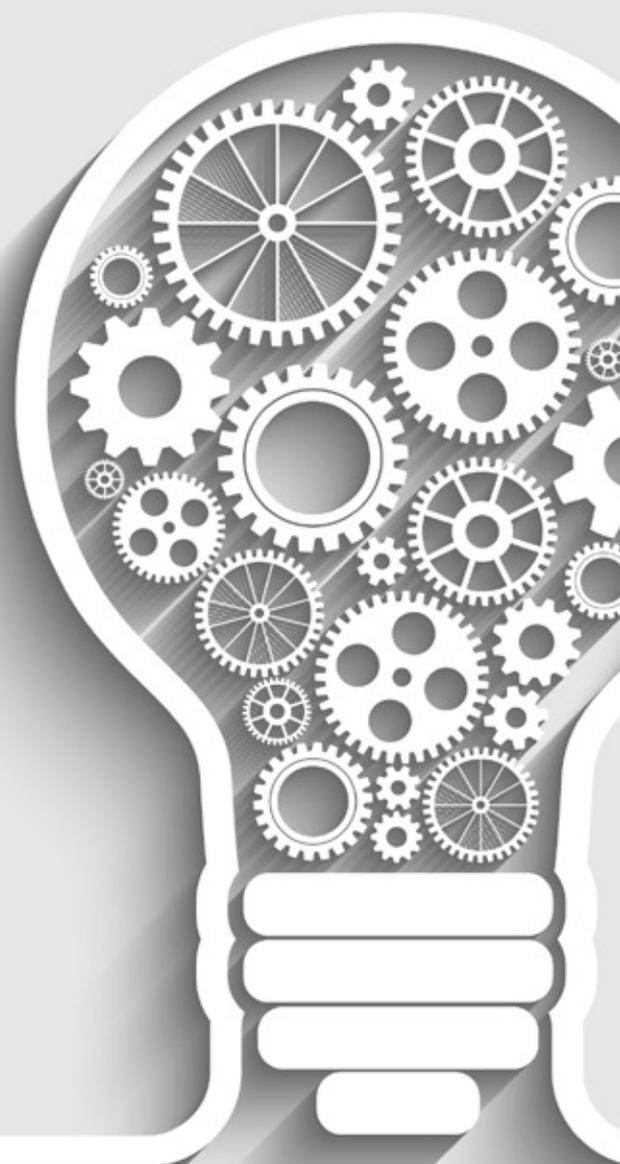
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In collaboration with A.T. Kearney and IMP³rove – European Innovation Management Academy



Preface



Philipp Rösler,
Member of the
Managing Board,
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Europe's economies, firms and citizens urgently need the economic growth that flows from increased regional competitiveness. The European Commission's recent Spring Economic Forecast struck a positive and very welcome note by highlighting a number of economic "tailwinds" that are expected to support lending, consumption and investment across Europe. In the context of the high unemployment levels and concerns over rising inequality, it is critical that European leaders across the private and public sectors capitalize on these improving conditions to deliver broad-based growth.

This report, part of the World Economic Forum's work on *Enhancing European Competitiveness*, suggests that European firms and political leaders could help achieve this growth by investing time, energy and capital in new forms of innovation, in particular by increasing the number and success rate of innovation-focused collaborations between young, dynamic firms and large, established companies.

Innovation can sustainably contribute to economic growth in two primary ways: first, by expanding the number and value of new products and services that people in Europe and around the world are willing to buy; and second, by commercializing productivity-enhancing inventions and processes that make better use of the region's labour and capital.

To be able to reap the full benefits of innovation, Europe needs to overcome two challenges

First, although Europe includes within its borders six of the world's 10 most innovative economies, the region as a whole is fragmented in terms of its innovation capabilities and contains many economies that remain far below potential in their ability to translate new ideas into valuable products and services. Europe has an increasingly vibrant set of entrepreneurship hubs, but as detailed in our previous report, *Fostering Innovation-Driven Entrepreneurship in Europe*, young firms face a wide range of barriers when it comes to scaling up their great ideas. **The region therefore needs to invest in both the framework conditions for commercialization within a large number of countries as well as in the cross-country links that enable firms, research centres and governments to take advantage of Europe's regional markets and assets.**

Second, the traditional models of innovation that characterize the most successful and innovative European firms to date may not be sufficient to deliver the growth that is needed in the future. As we have seen in the digital and mobile revolutions of the last two decades, in-house, captive research and development (R&D) models managed by large incumbent firms are extremely good at delivering incremental and sometimes even radical innovation within a specific product category to an established set of customers, but are not so good at creating disruptive products and entirely new markets.

This report therefore focuses on one rapidly-emerging and highly promising innovation approach: collaborative innovation between young, dynamic firms and large, established businesses, leveraging the resources of both to create value that spills over from firms to customers to entire economies. Based on extensive firm-level research as well as interviews with leading policy-makers from across the region, the report identifies common challenges and recommends specific strategies for improving the quality and quantity of successful collaborations that can contribute to Europe's competitiveness.

True to the Forum's identity as an international institution for public-private cooperation, the report highlights the critical role that policy-makers and political leaders play in supporting collaborative innovation, looking beyond requests for more supportive regulation or subsidies to the awareness-raising power, networking opportunities and skills support that public-sector leaders can provide. In addition, it draws on the direct experience of five of Europe's current political leaders in highlighting how national governments are focusing on widening and deepening the region's innovation capabilities.

As with all of our reports, this document is meant to spur debate and catalyse new activity across business, government and civil society. The World Economic Forum and I welcome your feedback and input for this work as we continue to support innovative individuals, firms and economies, not just in Europe, but around the world.

Executive Summary

This report seeks to support European competitiveness and growth by addressing the challenges that both young, dynamic firms and established businesses face when they seek to collaborate with one another to commercialize innovative products, services, processes and business models. It suggests firm-level strategies and opportunities for public-private cooperation to increase the success rate and impact of such collaborations.

This particular form of “collaborative innovation” – where a young firm and an established firm share complementary resources and combine efforts to support innovative ideas – can create significant value for both parties as well as for the economies in which such collaborations take place. Given the urgent need for economic growth in Europe and the challenges faced by innovative European entrepreneurs who seek to scale across fragmented markets characterized by limited access to venture financing, the potential of these partnerships to contribute to innovation and growth is particularly high for European firms and countries.

Based on more than 140 structured interviews and 20 multistakeholder workshops involving more than 450 participants, this report highlights the main challenges faced by young and established firms when they seek to collaborate, and discusses leading practices and strategies employed by both firms and policy-makers to improve the success rate of such collaborations. Although every partnership is unique and varies according to the specific goal, characteristics of the different firms and the market context, this research reveals a number of important challenges which are similar across geographies, sectors and industries and which can be managed by stakeholders across business and government.

These common challenges and suggested response strategies for firms can be grouped into three “layers”– **Prepare, Partner and Pioneer**. World Economic Forum research suggests that often the most significant challenge and the greatest positive impact springs from how well firms prepare to collaborate: having well-defined objectives, a carefully-designed business case, suitable organizational processes. A supportive culture and links to relevant networks are important predictors of success, yet are commonly underappreciated by both young and large firms.

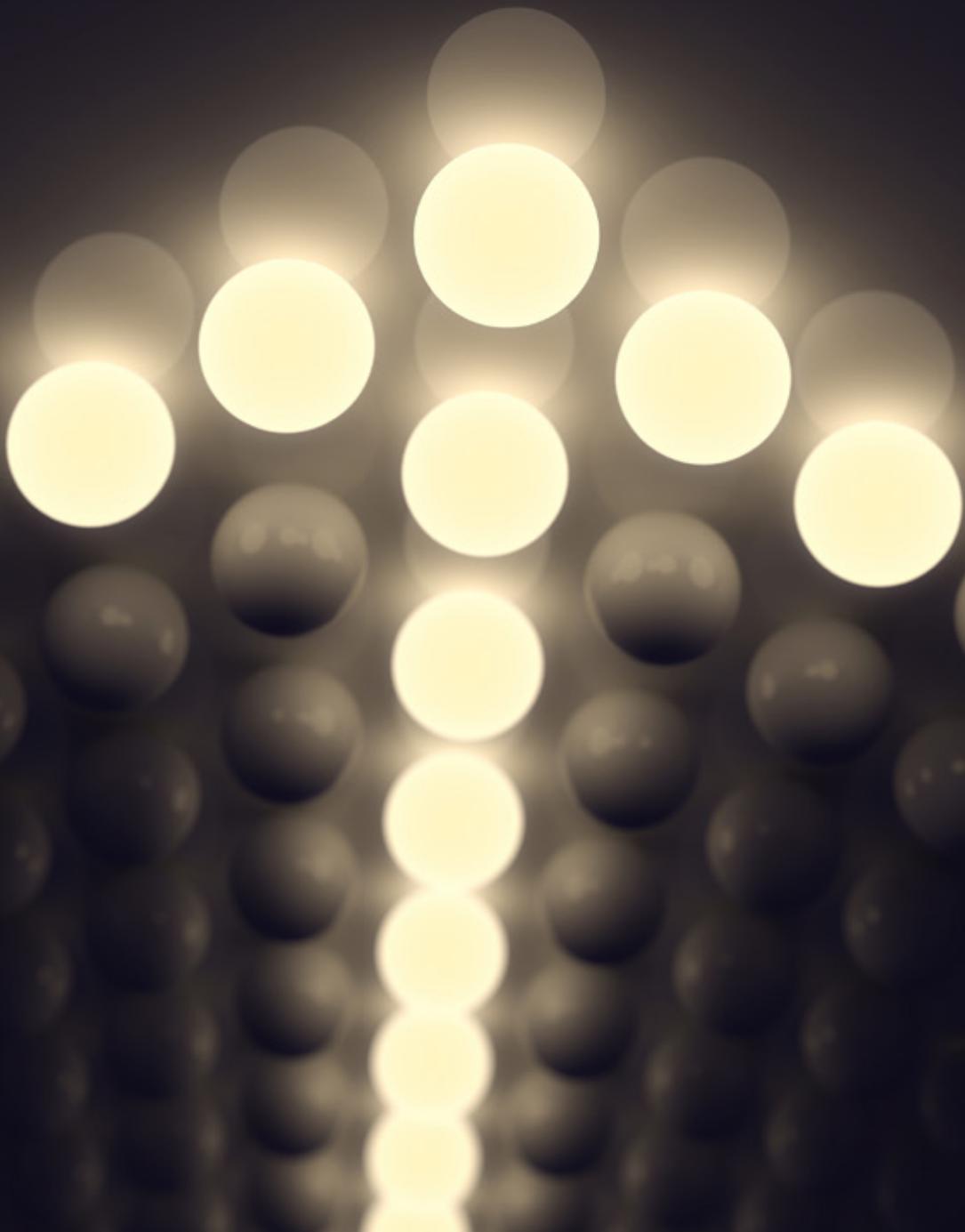
While many of the strategies discussed here can be executed by firms themselves, policy-makers and public-sector champions can support collaborative innovation via three categories of activities that go well beyond the traditional policy levers of regulation and subsidies – **Empower, Educate and Enable**. For example, political leaders play important roles in empowering and even linking firms looking to collaborate; in educating firms and individuals and helping provide the capabilities required to partner well; and in directly enabling collaborations through supportive regulation and relevant infrastructure investments.

Accordingly, the first section of this report discusses the relevance and benefits of collaborative innovation, with a particular focus on its value to European economies. The second section presents a range of firm-level challenges and strategies that can be employed by both young and established enterprises and highlights a number of examples. The third section provides perspectives from European policy-makers who are championing approaches to collaborative innovation and the fourth section concludes and provides reflections on the future of collaborative innovation.

Both this research and the academic literature indicate significant benefits of increasing the number and quality of cross-firm and cross-sector collaborations aimed at novel products, processes, services and business models, as well as a range of concrete, low-cost steps that firms can take to improve their probability of success. European entrepreneurs, firms and policy-makers all have the incentive and opportunity to benefit from collaborative innovation, in turn supporting the scaling up of young firms, the innovative output of established firms, and the competitiveness of European economies.

Section 1

The Value of Collaborative Innovation



Innovation as a Driver of Growth

Innovation – defined in this report as the successful commercialization of novel ideas, including products, services, processes and business models – is a critical component of economic growth. Across Europe,¹ the importance of innovation as a driver of growth and competitiveness has and will continue to increase,² thanks to the slow rate of population growth in the region, diminishing returns on additional capital investment and increasing competition from other regions.

Innovation drives growth in two connected and complementary ways: by introducing new or improved products or services that tap into existing or latent demand in the market, thereby creating additional value for firms and consumers; and by increasing the productivity of firms employing such innovations.

In Europe’s relatively mature economies, incremental improvements to products and services – what disruptive innovation expert Clayton Christensen terms “sustaining innovations” – enable firms to maintain global relevance in existing market segments.³ They do not generate significantly more value or enable companies to compete with entirely new offerings or business models. Collaborative innovation can, however, foster new growth through new products and non-market considerations that enable the evolution of entire systems – what Christensen refers to as “market-creating innovations.”⁴

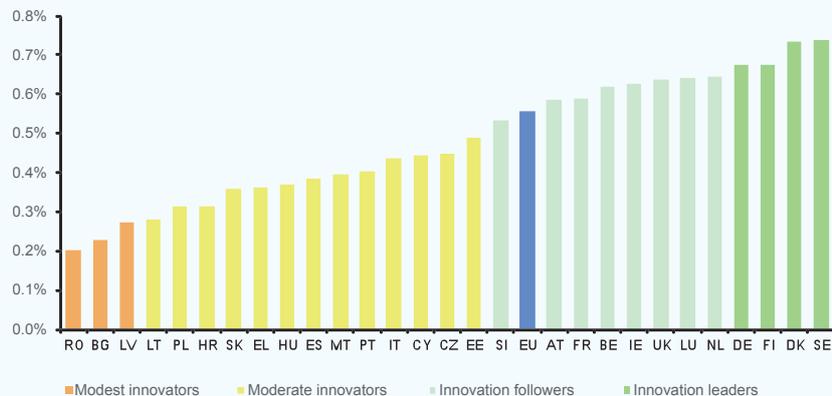
Europe’s competitiveness and innovation challenges

The European Union (EU) includes six of the 10 most innovative economies in the world, but also many countries that urgently and significantly need to improve their innovation capability (see Figure 1).⁵

Europe as a region varies greatly in terms of both competitiveness and innovation. The large differences between European countries are driven by factors such as the number and quality of linkages between firms and entrepreneurial ventures, and between the private and public sectors. This fragmentation impacts the ability of firms to turn R&D investments into intellectual property (IP) and commercialized products, and it hampers European competitiveness in comparison with other regions.

This gap is detrimental to Europe’s economic performance as a whole, especially when it comes to competing with other global economies such as the United States (see Figure 2) where scientific collaboration between the private and public sectors is almost double that in the EU and new technologies are commercialized with 17% more license and patent revenues from abroad.⁶

Figure 1: EU Member States’ Innovation Performance⁶



Source: European Union Innovation Scoreboard 2015

Figure 2: Comparison of Competitiveness: EU28 versus USA⁷

Comparison EU-28 versus U.S. based on CGI 2014-2015



Source: Global Competitiveness Index 2014-2015

Indeed, the European Commission's assessments of Europe's own innovation capabilities illustrate that emerging economies are rapidly catching up with Europe. China's innovation performance, for example, was measured at being 49% of the EU level in 2015, up from 35% in 2006.⁸ Even considering that China's progress springs from a relatively low level, the country is continually entering higher value-added segments of global production and employing its enviable economies of scale to better compete with European production.

What an increasingly competitive landscape means for Europe's innovation approach

The shifting external context for firms and economies and the increasingly competitive global environment create pressure on the traditional research, development and innovation models from which European firms have benefited. Firms regardless of their location report that in the past the majority of R&D spending was focused on "incremental innovations," and only 14% on radical innovations.⁹ Furthermore, firms have traditionally focused on developing their internal R&D capabilities, rarely sharing outcomes with partners to foster mutual competitive advantage.¹⁰

When asked about their investment plans for the next decade, most large multinational companies expect the focus of their innovation investments to change significantly, moving towards riskier initiatives and breakthrough or disruptive innovations. Due to a lack of internal capacity

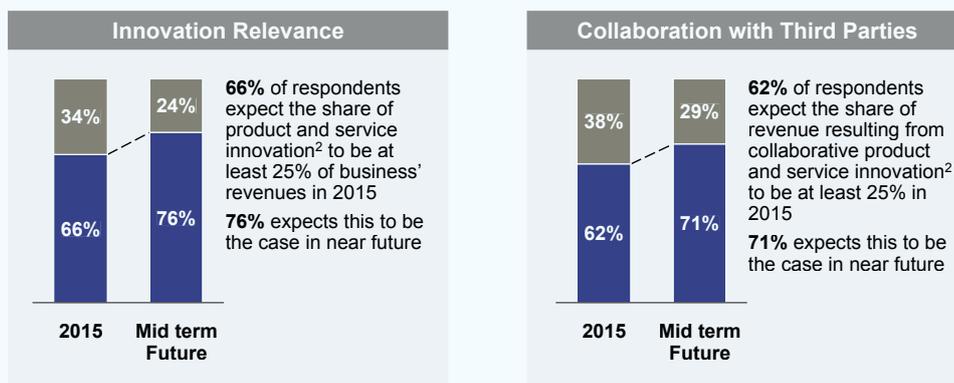
in this regard, firms are increasingly collaborating with external parties,¹¹ moving to more open forms of innovation, leveraging partners' discoveries, and commercializing innovations with other parties whose business models are better suited to bring new goods or services to market.¹²

Such a shift towards collaborative approaches seems to make business sense – there is emerging evidence that such collaborations enable firms to accelerate innovation and create more competitive market positions, whereas firms that remain internally focused face slower time-to-market, higher development costs, and loss of competitive position.¹³ Furthermore, such a shift mirrors expectations of a change in revenue sources: a recent A.T. Kearney study on "Collaborative Innovation in Digital Europe" found that 71% of respondents expected more than a quarter of revenues to be generated through collaborative innovation by 2030 (see Figure 3).

Collaborative innovation also makes sense at the macroeconomic level when it contributes to firm growth. *The Scale-up Report* from the United Kingdom (UK) suggests that were a mere 1% of the country's businesses to move into a "high growth" mode, they could create 238,000 jobs and almost £39 billion (\$61 billion) in additional turnover over three years.¹⁴

The clear implication is that Europe should look at collaborative innovation as a means of taking advantage of a number of otherwise threatening global trends, including the increasing innovativeness of other regions, rapid technological changes, rising demand for novel products and services, falling transaction costs, and shorter product life cycles driven by digitization.

Figure 3: Expectation of the Revenue Generated from Collaborative Innovation, 2015 and 2030¹⁵



Source: A.T. Kearney Survey

“Europe is good at transforming euros into knowledge. It is not good at transforming knowledge into euros.”

”
Carlos Moedas, Commissioner, Research, Science and Innovation, European Commission

“Competitive advantage doesn't go to the nations that focus on creating companies, it goes to nations that focus on scaling companies.”

”
Sherry Coutu, CBE, Entrepreneur, Non-Exec Director, Investor and Advisor to Companies, Universities and Charities

Collaborative innovation as a way for young firms and incumbent players to complement one another for mutual benefit

As discussed in the Forum's report *Fostering Innovation-Driven Entrepreneurship in Europe*,¹⁶ an important and valuable strategy for young firms to scale within Europe is to collaborate with larger, established firms to access a variety of financial and organizational resources. Similarly, established firms seeking to improve their external innovation capabilities can take advantage of the different perspectives, approaches and risk outlooks of young firms. Young, dynamic firms are often structured around the development of truly novel and potentially disruptive products and services, while established firms have deep-rooted processes and value networks. Collaborative innovation partnerships can exploit these complementary capabilities.

In particular, young firms bring fresh perspectives on nascent markets, and are unencumbered by complex processes, the demands of large, influential customers, or the burden of fixed capital and human costs.¹⁷ Young businesses are often closer to those users and customers who represent growth-oriented markets, and can be more flexible than larger firms in experimenting with different approaches, enabling themselves to respond more nimbly to shifting needs.¹⁸ Young firms can therefore develop, test and launch novel products and services faster than large firms, as the processes and structures that enable large firms to successfully operate and manage risk (as well as deliver a meaningful contribution to their bottom line) can also slow or halt innovation processes which are not directly in line with a large firm's core business or customer needs.

Meanwhile, the size, resources and experience of large and established firms endow different, though equally important, advantages. Larger firms possess financial resources lacking in almost all young firms, as well as the networks, experience and regulatory knowledge needed to successfully commercialize new offerings, giving them a particular advantage where knowledge is cumulative (see Table 1). This capital and expertise means they are better able to afford and manage IP protection, hire the most qualified and relevant human resources, and rapidly scale successful experiments across multiple markets.

Amid a wide array of different relationships between young and established firms, five main types of partnerships can be termed "collaborative innovation": smart procurement, collaborative innovation projects, smart direct investments, joint ventures, and strategic innovation partnerships, which are discussed in detail in the following section.

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Collaborative innovation is the next big idea that needs to shape up with actionable items, allowing players across the value chains to participate in the emergence of new collaborative business models. Anchored in solid foundations of intrapreneurship, collaborative innovation is the engine of modern, agile organizations capable of creating new capacity, which can pioneer radical new ideas while testing the limits of markets. A true best friend for growth.

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Mark Esposito, Professor of Business and Economics, Harvard University Extension School, Grenoble Ecole de Management

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DuPont has been applying science and innovation to address the world's most difficult challenges for over two centuries. Today, these challenges are of increasing complexity and scale. One company cannot solve these challenges alone. Our global partnerships and our collaboration with other companies, governments, universities, NGOs, and others are the key to meeting customer and consumer needs in critical areas such as food security, an improved energy mix and the protection of people and the environment.

”

Ellen Kullman, Chair of the Board and Chief Executive Officer, DuPont

Table 1: Challenges and Capabilities: Young, Dynamic Firms and Established Companies

	Young, dynamic firms	Established companies
Capabilities	<ul style="list-style-type: none"> • Closer to sources of technological knowledge, such as universities and research centers • Higher degree of flexibility • Nimbler response to market signals • Proficiency in a specific niche 	<ul style="list-style-type: none"> • Resources, experience and knowledge to successfully commercialize new offerings • Spread of R&D costs over an extensive and diversified sales base • Sophisticated IP protection and management due to experience and resources • Less threatened by litigation • Regulatory and compliance expertise • Market reach
Challenges	<ul style="list-style-type: none"> • Scarcity of resources, few physical assets (that banks can use as collateral), and limited record of success • Lack expertise outside of core offerings • Lack of scale, distribution channels, and marketing know-how • Competition, market entry problems, and poor infrastructure • Insufficient understanding of innovation's full applicability and potential 	<ul style="list-style-type: none"> • Possible bureaucracy and inertia, leading to slower information flow, less flexibility and less creative thinking • Less access to new technologies and state-of-the-art engineering • Risk-averse culture

Source: Project team



0 COMPANIES
and INNOVATE in
REAL
EX WORLD!

COLLABORATIVE INNOVATION

TRANSFORMING BUSINESS, DRIVING GROWTH...

Section 2 Successfully Managing Collaborative Innovation



PREVENTING 'SCALE UP':
ESS to SKILLS
ERSHIP CAPACITY
ORT (UK)
ANCE

SHERRY COUTU
ROB VAN LEEN
MARTIN RUPPERT
DOMINIC LEWELLYN



WHICH LEVER?
NY 10B
WEST 60B

EBIT?
BAD POLICY
MAKING

12-18
MONTH
DELAY
SME



A SAFE ENVIRONMENT
for START UP

HOW to
INNOVATE
WITHOUT KNOWING
WHAT YOU'RE DOING

INCENTIVES
SET TARGETS
POLICY:

- LICENSING
- ORPHAN PRODUCTS

PREPARATION
BE a MAGNET
with REPUTATION



WHAT is the
PRODUCT for...

BY 2010
\$X from
INNOVATION!

DELL
'ENTREPREN
MINDSET'

S.M.E.

PROBLEMS
CANNOT BE
SOLVED in SILOS
BEYOND CSR



WORK 'n
HEALTH

HEALTH:
AFFORDABILITY
ACCESSIBILITY
INCLUSIVITY

2 YEAR
IMPACT

NUMBERS 4 GOOD



how to measure

The Prepare, Partner and Pioneer Model

Collaborative innovation relationships are highly sensitive to the unique situation of each participating company and stakeholder. There are, nevertheless, a number of common challenges that both young and established firms around the world experience when collaborating, and a set of corresponding principles and strategies to improve the chances of success.

Based on interviews and workshops, this report proposes a model for managing collaborative innovation that consists of three layers: **Prepare**, **Partner** and **Pioneer** (see Figure 4).

- **Prepare:** The preparation layer lays the critically-important and often overlooked foundation for collaboration, and involves defining objectives, finding the right partners, preparing both organizations culturally and through incentives to support collaborations, and connecting with the right potential partners.
- **Partner:** The partnering layer focuses on negotiating and tailoring the projects with partners to ensure that the benefits, risks and governance aspects are adequately defined.
- **Pioneer:** Finally, the pioneer layer ensures that partnerships adapt and thrive for the mutual and sustained benefit of all parties as they are executed and as the context changes.

Discussions around the globe with business leaders and entrepreneurs who have experience with these types of collaborations indicate that the steps highlighted in Figure 4 are the most important shared layers for building successful partnerships focused on innovation. The degree of relevance and importance of these layers will be driven by technology type, sector practices and capital intensity

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While we have seen a lot of innovation from young upstarts on the African continent, the next step in the cycle of innovation for these upstarts is to partner with and collaborate with larger and more established corporates and multinationals in order to see those innovations reach the scale many of them miss out on.

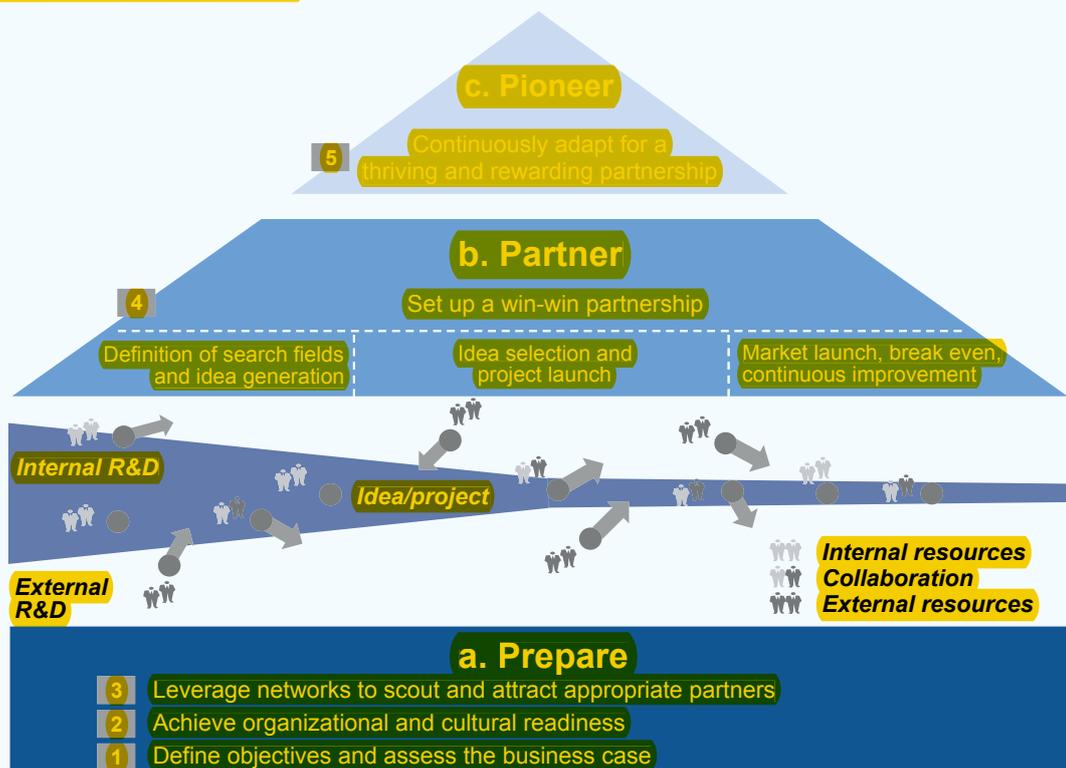
”

Rapelang Rabana, Chief Executive Officer and Founder, Rekindle Learning

of the collaboration. In IP-intensive industries where the purpose of the partnership is actively developing and testing new products, negotiating IP agreements and ensuring all parties are adequately protected will be highly significant, particularly compared with cases where IP clearly resides with one party. Similarly, in asset-intensive industries, negotiations will require clear rules regarding capital flows and timing, and may favour standalone structures such as a joint venture vehicle.

While the model described in Figure 4 suggests that the preparation layer is a valuable precondition for partnership, the approach to collaborative innovation described here is relevant for all firms, including those currently engaged in innovation-driven partnerships, as it is often necessary to reassess and redefine objectives and tweak partnership models along the way to ensure alignment between parties.

Figure 4: Collaborative Innovation Model



Source: Project team

A. Prepare

Dimension 1: Define objectives and assess the business case

Introduction and definition

Firms routinely underestimate the need to define clear objectives around partnerships. Collaborations have a far higher chance of success when both parties have clear, communicable objectives for collaboration that are accepted across organizations, and linked to a carefully thought out, well-designed business case that shows how value can be captured and delivered to relevant partners.

Establishing clear objectives requires carefully scoping the innovation area, identifying desired outcomes for various stakeholders within the firm, and assessing how these support the organization's overall strategy. Without this clarity, there is a far higher risk of failure to find a suitable partner, misalignment between parties in the event of a partnership, lack of organizational support within the firm or friction around how costs and benefits are shared. One strategic decision that must be taken is whether to collaborate instead of acquiring know-how and capabilities to address the innovation need. The business case is a complementary assessment of whether the objectives are realizable and whether the expected benefits exceed the direct and indirect costs and risks of collaboration. The business case is also important to examine how these benefits and risks might be shared between prospective parties.

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In collaborative innovation one of the key success factors is to define a clear proposition that creates value for your partner instead of selling an idea or innovation: for example we do not sell carpet, but well-being of employees.

”

Alexander Collot d'Escury, Chief Executive Officer (2012-2015), Desso Holding

“

Delegating collaboration within the organization if the chief executive officer is not interested means it is dead.

”

Paul-Bernhard Kallen, Chief Executive Officer, Burda Media

Common challenges and pitfalls when designing objectives and business case

In interviews and workshops, established firms particularly highlighted the following challenges:

- Ensuring alignment between all levels of the firm required to support a collaboration – particularly between top management and executing teams
- Acknowledging the risk of collaboration failure while simultaneously making the strategic and indirect value of collaborative innovation visible
- Enunciating clearly the exact need or “pain point” that a collaborative approach is intended to address

Young firms cited the following challenges:

- Shifting their partnership mentality from a sales or investment focus to one of solving a challenge for the larger firm
- Appreciating the complexity of and the transaction costs involved in collaborative innovation, particularly in terms of dealing with the internal processes and response times of a large organization
- Assessing the opportunity cost of partnership in terms of time and resources invested – this is particularly relevant for exclusive innovation partnerships

Leading practices

Companies leading collaborative innovation projects create value by:

- Assessing and acknowledging the value of a potential collaboration at a strategic level within the firm and defining objectives to ensure executive commitment at multiple levels
- Transparently articulating the intent and business case for collaboration both internally and externally, defining the value and resources to be contributed by and brought to partners
- Being open about the perceived likelihood of failure and the risks that could result, and, if possible, incorporating these into broader corporate risk assessments
- Identifying in advance at which stages and with which protections sensitive commercial information could be revealed to a partner
- Taking the time to understand the constraints and considering the costs and benefits of partnering from the perspective of potential partners, to ensure that collaboration objectives and processes are aligned for maximum mutual gain

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Be very specific about how you are helping a large, established business to address an innovation challenge they currently have.

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Amine Chouaieb, Chief Executive Officer and Founder, CHIFCO¹⁹

A key benefit of building a careful business case is that both firms are able to consider the level of dependency that may be reached in the relationship. Research indicates that for small and medium-sized enterprises (SMEs), collaborating on innovation often means a significant shift in their business model as they orient towards the needs of a large partner.²⁰

If the partnership's importance diminishes for the larger firm while being the primary driver of growth for the younger firm, the risks are very high and can negatively affect both parties. As an example of good practice, ASML, the largest supplier of photolithography systems for the semiconductor industry, ensures that its stake does not exceed 25% of its partners' revenues.

Although some innovation leaders clearly define their objective for collaboration, research and experiences of large intermediaries indicate that this is often a step that companies fail to address, intentionally or otherwise.

Startupbootcamp, a European accelerator that matches large, established firms with young, dynamic businesses, indicates that the biggest question to address before engaging in any collaboration is the purpose of partnering.

After a young start-up is identified as having the disruptive technology or business model that a corporate is looking for, the large firm needs to have an explicit path of engagement. Large corporates often still need to address questions such as "Do we have the internal resources with the bandwidth and know-how to engage with this start-up?"; "Is there an identified road map and budget to support the process?"; and "Is there a preferred mode of engagement (licensing, co-development, equity investment)?" after the partner has been identified.²¹

Dimension 2: Achieve organizational and cultural readiness

Introduction and definition

Cultural acceptance and organizational preparation has a significant impact on the outcome of any collaboration. For a successful collaboration, organizational structures must encourage and enable dialogue and the rapid flow of information between two parties with very different ways of working, different incentives and different perceptions of the value of the collaboration.

Common challenges and pitfalls when aiming for organizational and cultural readiness

Established firms have highlighted the following challenges to guard against:

- The risk that ideas coming from outside the firm will evoke a defensive reaction from employees
- Incentive schemes and promotion tracks may dissuade employees from taking risks by increasing the personal cost of failure
- Existing functional silos and a lack of intra-firm collaboration may hamper any external partnership
- Complex, consensus-driven or otherwise slow decision-making process may frustrate entrepreneurial partners and reduce the ability to grasp time-sensitive collaboration opportunities

- The focus may shift to inbound innovation rather than on tapping the full potential of inbound and outbound innovation²²

Young firms, on their part, face challenges to:

- Accept constructive feedback on an idea that could be central to their identity
- Bear the cost of resources needed to set up and maintain a partnership with an established firm, particularly given the need to navigate complex legal and compliance processes
- "Speak the same language" as large corporate partners

Leading practices

Companies leading collaborative innovation projects create value by:

- Building on their diverse cultural and organizational strengths, creating mutual understanding, and harnessing complementary resources in partnership rather than mimicking one another or seeking cultural convergence
- Using highly visible senior managers as champions of external collaboration
- Setting up employee exchanges with partnering firms
- Rewarding collaborative activities, entrepreneurial mindsets, trial-and-error methods and rational risk-taking through incentive schemes and performance metrics, building into these the probability of failure
- Employing both physical and digital collaboration tools to facilitate knowledge sharing
- Setting up cross-functional and cross-organizational teams to make the most of capabilities
- Speeding up collaboration processes by decreasing resistance from employees through organizational alignment

Hospitality company Marriott International works in small cross-functional and cross-cultural teams with a global mindset and a focus on unlocking the entrepreneurial spirit by inviting entrepreneurs to come and have conversations with its innovation professionals.



Biotechnology company Novozymes applies the cross-functional team approach in its innovation teams by including professionals from the R&D department, technical service managers and business developers from marketing to ensure that business units have an influx of ideas and there is communication among the various innovation teams. In addition, the company has developed a digital platform to use social algorithms to connect people and ideas across business units, thereby fostering cross-enterprise innovation. Professionals across different functions join innovation teams to share knowledge and ensure fast diffusion of innovation. To date, 25% of the entire employee pool has participated and contributed to supporting and democratizing innovation. The capabilities developed as a result of cross-functional collaboration will serve a valuable function when Novozymes seeks to partner with young firms.

Chemicals- and drug-maker Bayer has strategic partnerships with the Broad Institute of MIT and Harvard in the field of Oncology. To foster scientific exchange and to build a common understanding between the partners, respective governance boards consisting of a strategic and a scientific committee have been installed. Furthermore, personnel are being exchanged between the parties to allow a better understanding of each other's culture, broaden individuals' horizons and promote different thinking. The value of the collaboration for Bayer lies in the opportunity for the partners to gain mutual benefit by bringing in different perspectives and complementary skills. To leverage the full potential of such partnerships, the alliance is actively steered and managed to build the foundation of a trustful relationship.²³

“

More and more large organizations are learning to work with innovative start-ups, and it is clear that corporates are now much better connected in this regard than a decade ago. Those who create such links derive strategic value as they tap into an efficient and growing reservoir of ideas and technologies.

”

Luis Alvarez, Chief Executive Officer, Global Services, BT

Dimension 3: Leverage networks to scout and attract appropriate partners

Introduction and definition

The preparation layer also includes finding and becoming part of networks that can help identify potential partners for collaboration as well as developing the company's reputation as an attractive innovation partner. Networks in this sense include both structured and self-organized groups, including industry clusters and associations, online communities, informal business connections, research communities and links that can be provided by specialized advisers, intermediaries and capital providers. Such networks are invaluable for identifying and connecting with firms to collaborate with, but vary in terms of how focused they are on supporting innovation-driven collaborations. At one extreme, informal business networks tend to operate serendipitously, while specialized intermediaries such as the Startup Europe Partnership actively seek, match and coach prospective partners to increase the success of collaborations.

Common challenges when scouting for partners and entering collaboration

The challenges that large firms face when joining and using collaboration networks include:

- Ensuring that the employees who are networking have a deep understanding of the collaboration needs of the firm, as well as the authority and ability to internally support negotiation and partnership structures
- Balancing the need to invest in a specialized partnering division with the danger that resulting collaborations will become confined to “corporate venturing,” “procurement” or other adjacent departments

Young firms face challenges in:

- Balancing the need to spend time networking across multiple networks with the time and resource demands of a dynamic firm
- Finding the suitable operational entry point and the right counterparts in established organizations

Leading practices

Companies with a strategic intention to partner for innovation pull different levers to ensure they are visible to interested parties. These companies:

- Map different available networks for suitability, letting collaboration objectives, business case and partner criteria influence their choice of networks, while assessing the expected costs and benefits of investing time and resources in different approaches
- Broadcast their specific collaboration needs to trusted influencers within these networks, and invest in understanding what other network participants are looking for

- Seek to develop a unique and consistent value proposition for partners so as to come across as a sought-after collaborator, highlighting core competencies and success in innovation
- Apply a two-sided strategy to actively search for potential partners while building a reputation as a collaborative innovator
- Engage in both structured and unstructured networks, employing specialized support where relevant while also being open to chance encounters beyond what may seem obvious matches in terms of geography and industry profile

Companies interested in collaborative innovation will join network events and conferences and even publish their innovation needs in targeted business and industry media to attract the most promising prospects. For example, Heineken features its intent to collaborate with young, dynamic firms on the innovation section of its corporate website. Siemens takes a similar approach through its Technology to Business (TTB) unit. Young firms can directly apply through the website by answering a questionnaire and submitting their proposal. Moreover, TTB scouts for the best-suited partners globally – not just within their home country or in Europe. Beyond obvious geography, TTB searches outside their industry using Big Data technologies or web databases to monitor potential partners.²⁴ Once established firms have initial partners on board, they can use their connections to tap into a larger pool of entrepreneurs.

There are several upcoming matching platforms that provide companies the opportunity to effectively search and partner. Spotfolio is a next-generation technology solution addressing networking challenges of both young firms and established businesses. It bridges the gap between these stakeholders through a unique technology radar which is based on a semantic web search, providing transparency and a plethora of opportunity for collaborative innovation. On Spotfolio's platform, businesses can select the technologies, products and services to be monitored on an ongoing basis, and access information on companies matching these criteria. Firms can keep track of corporations which show interest in their activities and monitor them, can save their searches and can get notified when a new firms meeting their criteria registers.²⁵

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Young, dynamic entrepreneurs may perceive networking as a waste of time, but it may be your biggest asset to access companies and hence scale-up. Especially when you apply a focused approach by joining industry associations for example.

”

Maxim Nohroudi, Chief Executive Officer, Allryder



B. Partner

Dimension 4: Set up a “win-win” partnership

Introduction and definition

The partnership layer includes negotiation and consequent establishment of a collaboration structure, including both formal and informal agreements that set the tone and legal framework for two different firms to work together. Establishing an effective partnership structure requires carefully aligning the business case for both parties with the terms of the partnership agreement, while also accepting significant uncertainty and allowing for evolution of the partnership with time.

Collaboration structures vary widely – from informal knowledge-sharing arrangements to carefully-staged acquisitions. The exact structure will depend on the unique circumstances of the firms and the goal of the collaboration, but common patterns can be discerned given the specific industry, technology, resource allocation and characteristics of the firms involved. Typical negotiations include contractual obligations, governance and dispute resolution structures, benefit-sharing plans and termination clauses.

Partnering for innovation differs from other types of partnership by embracing higher levels of uncertainty and by being future-focused. When young firms partner with established businesses, there is naturally the additional challenge of varying levels of power and resources that can complicate negotiations and create the need for special attention when agreeing upon structures.

Resource availability and know-how differences are in particular evident in IP-intensive negotiations. Intellectual property rights are at the heart of collaborative innovation in some industries, where they form an integral part of negotiations during the structuring process. Very often companies will bring existing IP to the partnership or will develop new IP through the collaboration. Consequently, it is important to have agreement in advance about the correct use and protection of IP in order to build a trust-based relationship and realize the full benefits of collaboration.

Common challenges and pitfalls when negotiating partnerships

The challenges that established firms face when setting up a “win-win” partnership include:

- Balancing the desire for maximum control over the partnership with the needs and motivation of the younger firm
- Working with in-house legal and compliance teams to create the necessary flexibility in partnership contracts and structures while still managing appropriate risk levels
- Moving quickly enough through the negotiation phase to keep younger partners interested and ensure that the opportunity is not lost due to internal friction

- Being careful not to overwhelm the smaller firm with due diligence and legal requirements that they may not be able to meet or afford to obtain expert advice on
- In relation to intellectual property:
 - Breaking with the tradition of owning and controlling IP and signing IP agreements without full-ownership provisions
 - Valuing alternative IP ownership structures and developing and implementing KPIs that appraise different IP plans

Young firms in turn find it challenging to:

- Balance between giving up control and gaining access to capital, particularly when it relates to a core product or service central to the young firm’s identity
- Afford expert advice on a par with larger firms and comply with all legal requirements
- Stretch time frames and negotiations over the longer time-period it takes for large, established firms to make and implement decisions
- Finance relatively large amounts of IP protection and negotiation costs upfront, or any renegotiation during the collaboration
- Manage requests to share competitive information prior to the signing of any contractual agreements (which is not advised without the protection of appropriate non-disclosure or confidentiality instruments)

“

Large companies should understand how collaboration interactions affect the pipeline for innovation. If they try to circumvent innovators’ IP or not appropriately share value, they sacrifice short-term for long-term value as their industries will not see significant external innovation. Innovators will shy away from industries where their human capital and financial investments will not be rewarded.

”

Raffi Mardirosian, President, Midori

Leading practices

In preparation for establishing a partnership, it is important to:

- Set up lean governance structures that offer flexibility while also maximizing informal channels of communication
- Draw on standardized partnering agreements to speed up the process and draw on the true strengths of each party
- Acknowledge the uncertainty inherent in the partnership and have a well-thought out plan in the event of failure
- Develop new, flexible IP schemes to meet the needs of collaborative innovation partnerships where both parties believe that they share a balanced and fair arrangement and the benefits of collectively developed IP
- Set a positive precedent for IP-intensive collaborations to enable trust-based negotiations in future

Common types of collaborative partnerships highlighted during research can be categorized in four groups (see Figure 5): smart procurement, collaborative innovation projects, strategic innovation partnerships and joint ventures, and smart direct investment, which are described in more detail in Table 2. These partnership structures can be differentiated according to how broad they are in terms of the life cycle of a particular innovative product or service, and how hungry they are for resources, particularly the financial and human resources required from the partners.

On the horizontal axis of Figure 5, which broadly situates each partnership type by its resource intensity, smart procurement (where the partnership is based on a specific

“
Goodwill to collaborate is present on both the corporate and start-up side. However, there are also barriers on both sides. The most common one we observe is the enormous difference in timelines. Start-ups expect deals to be made within a few weeks, whereas it often takes over a year to sign contracts within corporates. The ratio between follow-up discussion and closed deal is still low, not because there is no interest, but cause they need time to finalize: a week in the start-up world is a month in the corporate world. So, there needs to be education on both sides on expectations, processes and how to talk to each other.

”
Alberto Onetti, Chairman, Mind the Bridge Foundation, and Valerie Mocker, Senior Researcher, Nesta

need of the larger firm), and project-based collaborations (which are narrowly-focused, time-limited engagements) are commonly limited in terms of their draw on large firm resources. Smart direct investments can vary in their financial intensity but may consume large amounts of capital, while strategic partnerships often require more significant human resources and/or capital engagement over long periods.

The vertical axis indicates how broadly and deeply engaged the partnership is with the innovation life cycle from ideation to commercialization (see Figure 4 on page 11). Smart procurement and smart investment approaches tend to be rather “hands off” and involve the larger partner in specific phases of the innovation process, while collaborative innovation projects, strategic partnerships and joint ventures imply close engagement across the multiple phases of the innovation process.

“
Young firms are a great source of innovation. But effective collaboration requires established corporations to be faster and more agile as young firms have neither the time nor the patience to wait for the process that is typical for established corporations. Only then will the elephant and the mouse be able to dance together.

”
Thijs Jurgens, Vice-President, Innovation, Royal Dutch Shell

Figure 5: Collaborative Innovation Partnership Types



Source: Project team

Table 2: Collaborative Innovation Partnership Types

	Smart Procurement	Collaborative Innovation Project	Smart Direct Investment	Strategic Innovation Partnership and JV
	Collaboration based on an existing innovation	Collaboration for a specific innovation need	Collaborative innovation to scale innovations	Collaboration to co-develop and advance innovations
Characteristics	<ul style="list-style-type: none"> • In kind investment • Development funding • Purchasing agreement • Potentially new IP development • Defined scope within the innovation lifecycle • Requires limited additional resource or management attention 	<ul style="list-style-type: none"> • In kind investment • Development funding • Purchasing agreement • Potentially new IP development • Covers a specific part of the innovation lifecycle • Requires allocation is limited to project scope 	<ul style="list-style-type: none"> • In kind investment • Capital investment • Provides more control on the partner • Potential synergies • Potential for equity and investment upside • Covers a specific part of the innovation lifecycle • Requires management attention due to capital investment and proximity to the organization 	<ul style="list-style-type: none"> • In kind investment • Grant or capital investment • Provides more control on the partner • Co-branding • Potential for equity and investment upside • Relates to the entire innovation lifecycle • Requires management attention due to capital investment and reputation risk
Selected Types	<ul style="list-style-type: none"> - Incubator - Accelerator - Supplier collaboration 	<ul style="list-style-type: none"> - Supplier collaboration - Partnering with non-disclosure or exclusivity agreement 	<ul style="list-style-type: none"> - Partnering with market ready idea firms - IP investment 	<ul style="list-style-type: none"> - Joint development and scale up - Co-marketing and/ or co-distribution

Source: Project team

Different partnership contexts, firm needs and innovation characteristics will imply different partnership forms and models, which may differ substantively from those described in Table 2. There is some evidence, however, that collaborative innovations focusing on disruptive technologies or nascent markets do better in the form of joint ventures or smart investments, as such forms insulate experimental activities from complex processes or resource cannibalization that can occur when larger firms evaluate risky ventures on the basis of their existing core business.²⁵

To minimize risks and maintain the advantages of acting quickly, there is significant value – for both young and established firms – in having a set of clearly established “gates” for progressively negotiating and opening up data and opportunities to one another. To ease the negotiation process with young, dynamic firms, Royal Dutch Shell has simplified the governance structure for collaborations by decentralizing the decision-making for corporate approval and changing procedural requirements. It also applies different partnership structures to meet various objectives – approximately 80% of R&D programmes are based on pre-defined business needs, whereas 20% are more future focused. In this category, Royal Dutch Shell provides angel grants, but also engages in partnerships with non-disclosure agreements. A major determinant in their partnership structure is the fit of innovation with the firm’s systems.

“As a young, dynamic firm in the negotiation phase it is important to know the value you bring on table and aim high, to be categorized in the right bucket, even if it is to get on the radar of top management. If the large, established company can seal the deal with you without need to get board approval, you will be one of the many partners in a low category.”

”
Maxim Nohroudi, Chief Executive Officer, Allryder

“DigitalGlobe’s Geospatial Big Data platform is enabling a growing ecosystem of innovative firms to bring their expertise to our data to create new products that we can jointly monetize. It’s not just about collecting more satellite data, it is about enabling new applications that can scale like never before through innovative technology platforms and collaborative business models.”

”
Jeffrey R. Tarr, President & CEO

C. Pioneer

Dimension 5: Continuously adapt for a thriving and rewarding partnership

Introduction and definition

Once the partnership is structured and set up, subsequent efforts should be invested in attaining measurable results, managing uncertainty and searching for additional value to gain from the collaboration.

As with the preparation layer, this aspect of collaborative innovation is often undervalued, although all the value of collaborative innovation comes from solid, ongoing management of a complex relationship once the partnership is successfully established. In the words of one interviewee, collaborative, innovation-focused partnerships require “constant care and feeding,” particularly in volatile business and organizational environments. On the one hand, shifts in organizational structures, rapid firm growth or new priorities can threaten resource allocation or firm commitment on both sides of the relationship. On the other hand, opportunities to capitalize on and contribute to collaborations through the introduction of new partners, ideas or resources will continuously arise and should be harnessed whenever possible and appropriate.

Common challenges and pitfalls when striving to pioneer

Large, established businesses find particular challenges in:

- Maintaining internal commitment to collaborations once they are no longer the new, “sexy” project
- Breaking down internal silos and progressively opening other teams and groups to the collaboration in order to realize additional value
- Creating effective incentives for managers to continuously support the collaboration, rather than defaulting to a risk-averse approach to their time and resources

Young, dynamic firms in particular find it challenging to:

- Invest the necessary senior management time to manage the ongoing relationship
- Balance dependence on the ongoing partnership with opportunities to develop relationships externally
- Create resilience and a “plan B” to cope with the failure of a collaboration

“
The attitude of large companies keen to engage in collaborative innovation with young, dynamic firms is a key component of trust building. The large, established businesses should be selective in who they appoint to manage the negotiations and relationship – the primary driver of this person should be to foster the partnership and not come across as a potential competitor of the entrepreneur.
”

”
Peter C. Böhni, Managing Director, EPFL Innovation Satellite, Bühler

“
Collaborations are crucial for a Life Science company and a key layer of our Innovation Strategy.
”

”
Marijn Dekkers, Chief Executive Officer, Bayer

Leading practices

Firms successful in collaborative innovation continuously develop partnerships and focus on measurable results by:

- Sharing knowledge and integrating the results of collaborative innovation systematically across other product lines or activities within their business
- Continuing to search for additional benefits and mutual gain from the partnership
- Adapting to partners’ needs, developing ongoing mutual benefits and openly safeguarding incremental IP in a transparent manner
- Incentivizing team and employee support across both organizations
- Clearly managing expectations and emphasizing proactive communication
- Being frank and transparent about challenges, risks and the possibility of failure

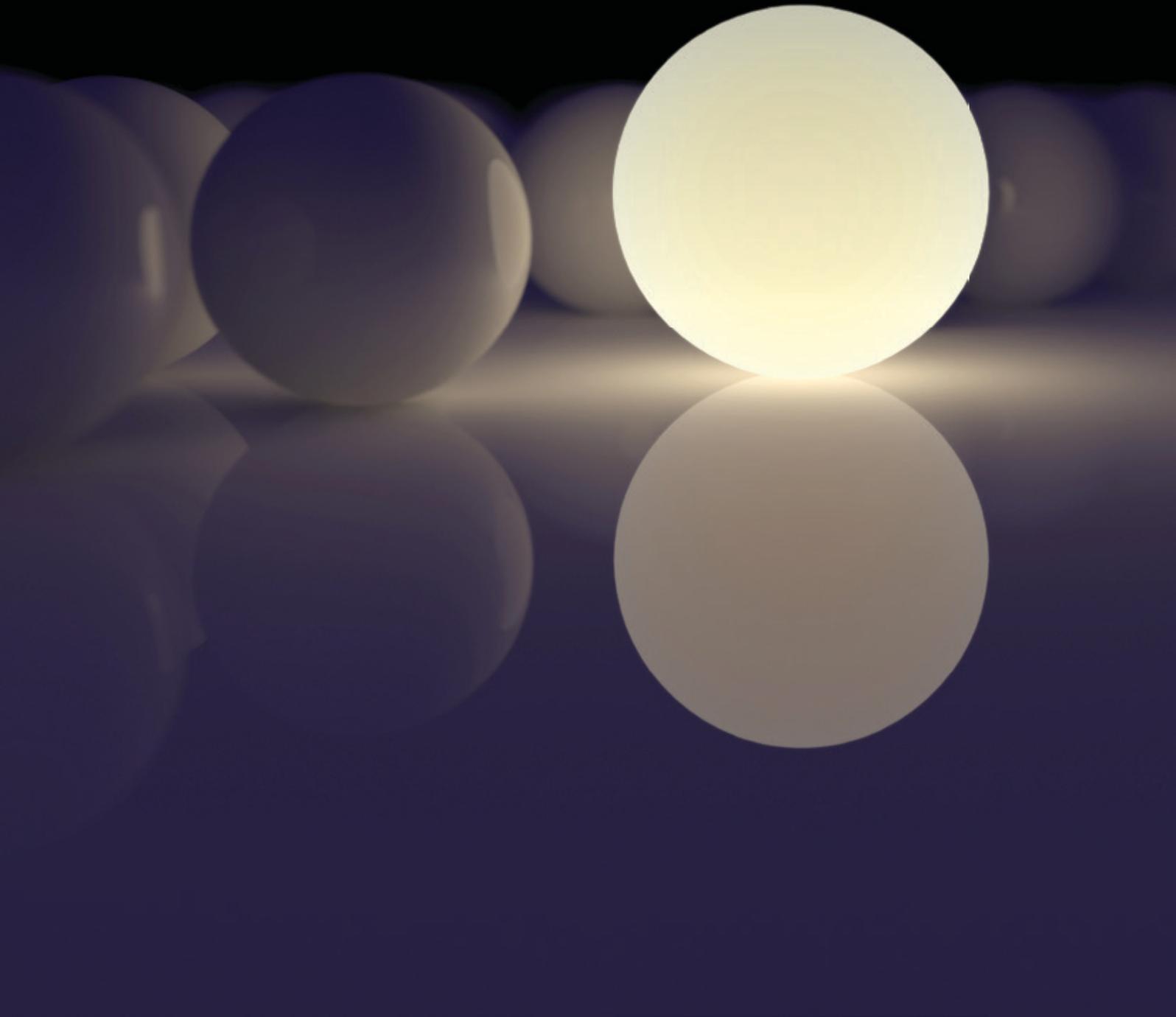
Pioneering partnerships therefore ensure that lines of communication remain open, that discontinuities are viewed as opportunities rather than threats, and that all parties continuously assess, adapt, realign, commit to and reinvest in the collaboration. For example, Novozymes and space imagery provider DigitalGlobe keep their partnerships out of the sales and commercially-driven departments to enable the collaborative innovation to flourish before exposing it to corporate pressures. DigitalGlobe places these in the R&D department in order not to stifle the team and have the focus on innovation rather than on next quarter’s figures.

“
Addressing complex societal issues can be best realized through collaborative innovation. At DSM, we strive to become a magnet for innovation with a purpose. Partnering with large and/or small firms will become increasingly important for us in order to develop successful innovations that deliver triple-P impact (People, Planet and Profit).
”

”
Rob van Leen, Chief Innovation Officer, Royal DSM

Section 3

A Public Policy Model for Collaborative Innovation



Empower, Educate and Enable

Governments and policy-makers can have a marked influence on the success of collaborative innovation in Europe. As can be seen from the policy-maker contributions in this section, political and policy leaders are increasingly interested in promoting innovation in general and collaborative approaches to innovation in particular. This section draws on interviews and workshops to highlight the supporting strategies that policy-makers can deploy to lower the costs and increase the benefits of collaborative innovation for firms, as well as ensure that societies capture as much of the benefits of such partnerships as possible.

Discussions with and public recommendations from entrepreneurs, business leaders and policy-makers reveal a tendency to focus on the power of the public sector to deliver long-term, regulation-based interventions that create new incentives or overcome barriers to collaboration

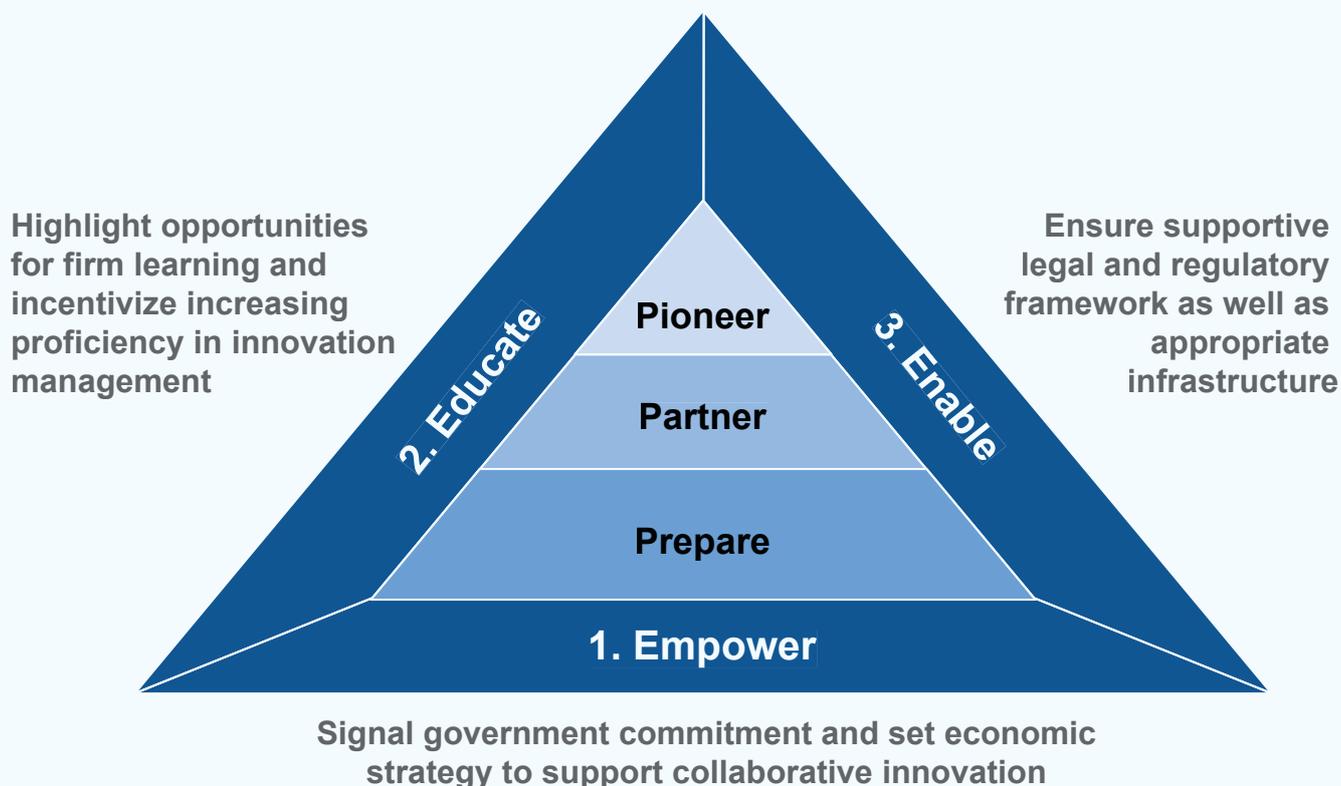
between firms. However, the research for this report indicates that policy-makers and public figures can support companies looking to partner and innovate through a wider range of activities, in particular by using their networks and “soft power” to highlight the benefits of collaboration and convene leaders from different sectors and geographies.

Figure 6 outlines three broad strategies that policy-makers can pursue:

- **Empowerment** by signalling government commitment and establishing an economic strategy that supports collaborative innovation
- **Education** that highlights opportunities for firm learning and incentivizes increasing proficiency in innovation management
- **Enablement** via ensuring supportive legal and regulatory frameworks as well as appropriate infrastructure

Policy-makers can use the checklist below to assess where they stand and what more can be done to foster collaborative innovation (see Table 3).

Figure 6: Policy Model for Collaborative Innovation



Source: Project team

Table 3: Empower, Educate and Enable: A Vision, Actions and Measurements for Policies to Address Collaborative Innovation Challenges

	Empower		Educate		Enable	
	Action	Measure impact	Action	Measure impact	Action	Measure impact
Pioneer	<ul style="list-style-type: none"> Consider collaborative innovation on a strategic level Analyze and highlight success factors of partnerships Award the development of innovative and scalable practices 	<ul style="list-style-type: none"> What share of countries and regions addresses collaborative innovation on a strategic level? What share of businesses continuously consider potential partnerships? What is the outreach and media attention of lighthouse events, e.g., an award for inspiring and scalable innovation management practices? 	<ul style="list-style-type: none"> Create mentorship programmes Develop knowledge sharing platforms for management of collaborative innovation to provide specific expertise relevant for pioneering 	<ul style="list-style-type: none"> What is the scale of the mentorship program and obtained feedback? What is the number of visitors and active users of the knowledge sharing platform? 	<ul style="list-style-type: none"> Provide tax incentives for collaborative innovation 	<ul style="list-style-type: none"> What is the number of partnerships claiming tax incentives? What is the aggregated profits generated by collaborative innovation partnerships?
Partner			<ul style="list-style-type: none"> Enhance proficiency in collaborative innovation <ul style="list-style-type: none"> - In practice - In the education system Close IP knowledge gap for young, dynamic firms to strengthen their negotiation position relative to large firms 	<ul style="list-style-type: none"> How many collaborative innovation management programs are launched? How many companies participate in education programs? What is the level of proficiency gained in collaborative innovation? 	<ul style="list-style-type: none"> Build digital data bases to match potential partners Enhance standardization and harmonization of regulatory frameworks related to IP 	<ul style="list-style-type: none"> How many collaborative innovation partnerships are established through digital or physical platforms?
Prepare					<ul style="list-style-type: none"> Establish free collaborative innovation zones with clear exit requirements 	<ul style="list-style-type: none"> What is the number of firms and the speed they get out of free collaboration zones?
<p>Vision: regional strategy for collaborative innovation between young, dynamic firms and established companies where all business representative are aware of such partnership</p>			<p>Vision: all academic institutions offer master program on innovation management, incl. collaborative innovation; any business representative has access to suitable trainings</p>		<p>Vision: achieve nearly zero transaction cost in collaboration and recover any related tax incentives within 12 months due to strong economic growth of these partnerships</p>	

Source: Project team

Figure 7: Project workshop break-out group discussion during the World Economic Forum Annual Meeting 2015



1. Empowering collaborative innovation

Empowerment refers to ways in which political leaders and policy-makers can signal commitment and link collaborative innovation to a country's economic strategy, as well as use the convening power of government to bring diverse groups of business leaders together.

Policy-makers have an important role in raising awareness of the value that collaboration across firms and sectors can bring. The business opportunities represented by collaborative innovation may not always be evident to the corporate leaders who most need it, preoccupied as they are with the daily demands of business. Championing innovation and the value created by collaborative efforts can help make businesses more open and receptive to external ideas. The long-term ambition should be to have a generation of government leaders who see their role as linking large firms and entrepreneurs to the economic strategies of their cities, regions and countries.

Empowering strategies that policy-makers should consider start with their networks – they can bring together key stakeholders through personal engagement. Both Prime Minister Mark Rutte of the Netherlands and his special envoy for start-ups Neelie Kroes are using their personal networks to support increased innovative activity among young and established firms in their country.

Another important approach is to recognize the importance of collaborative approaches to innovation in national economic strategies, which gives an important signal to businesses to explore the value that lies in experimenting with innovation-focused partnerships. This approach has been taken by Prime Minister Stefan Löfven of Sweden, who has placed innovation at the heart of his country's new economic strategy.

Mark Rutte, Prime Minister of the Netherlands

Stories of ground-breaking innovations often begin with a creative individual working away in the attic or garage. We all know the examples of Steve Jobs and Bill Gates. But few of those brilliant minds actually become CEO of Apple or Microsoft. Fortunately, we are capable of organising our own creative setting. Because the brainpower of creative individuals only really bears fruit when combined with the knowledge, creativity and capital of others. Other scientists, certainly, but also companies, research institutions and government bodies.

In my country we've organised a creative setting of this kind. It's in Eindhoven, and we call it the 'Brainport'. It's one of the smartest locations in the world. It's the innovation hotspot in Europe. It attracts 24 per cent of all private R&D investment in my country. And it's the European region that registers the most patents. Brainport Eindhoven is successful because it focuses on building strong relationships between industry (both SMEs and multinationals), top scientists from all kinds of disciplines, and government.

Brainport is an excellent example of the new innovation networks and districts that we see emerging in many places. It's a trend we welcome and want to encourage. Innovation networks should be accessible to creative individuals across the globe.

One of the barriers to further growth of Brainport Eindhoven is access to capital for young businesses and start-ups. In the US we see more and more corporations getting involved in venture capital. We can do the same in Europe. Corporate venture capital needs to get bigger all over Europe. This is another area where innovation hubs like Brainport Eindhoven can play a role. And the good news is the first foreign venture capitalists have already found their way to Brainport Eindhoven and have announced they intend to invest in various start-ups located there.

Business angels and venture capitalists help entrepreneurs cross the so-called 'valley of death' between product development and commercial viability. When it comes to venture capital, a striking example is the corporate venturing from large companies like Bayer, which plays a vital role in fostering collaborative research. Corporate venture capital is a hybrid model to spur innovation outside the company. More corporations are doing venture capital deals and we see a small group of 'hyperactive' corporate venture investors such as Google and Intel. They play a more important role in the venture capital ecosystem. In Europe too, the big corporations can play a larger role.

Recent research by the OECD shows that young firms, mostly SME's, are responsible for at least 50% of job growth. Due to their easy adaption to new technologies, start-ups play a crucial role in the collaborative innovation approach in which is central to Brainport Eindhoven's success. Closer and better networks are essential if we want to strengthen the position of start-ups in the Netherlands and help persuade innovative foreign start-ups to establish their businesses in the Netherlands. For that reason we have recently appointed former European Commissioner Ms Neelie Kroes as a special Start-up envoy for The Netherlands. And I am confident she will guide the Netherlands in the direction of an ever more successful start-up Delta where Dutch innovation can flourish in and between companies, laboratories, campuses – and many attics and garages.

Stefan Löfven, Prime Minister of Sweden

One of the first promises I made when I was in the running to become Prime Minister of Sweden was that I would set up a National Innovation Council. Some thought this was a bit odd, as innovation is not an issue that voters care much about. But the fact is that they should.

A successful innovation policy is key to creating an environment that will support business start-ups, encourage companies to grow and enable growth of the economy. In the global economy, Sweden will never be able to compete on low wages or low taxes. Instead, we need to continue to increase our competitiveness by developing new and attractive products, services and business methods.

The hands-off view that markets will manage this by themselves belongs to the past. In today's high-tech and knowledge-based economy, all sectors of society need to be involved.

In my view, it is government's responsibility to support innovators and entrepreneurs by providing the best possible innovation environment. By establishing the National Innovation Council, we have elevated innovation to the highest political level. This will simplify decision-making, especially seeing that several policy areas are often involved in innovation-related issues.

Within the framework of the Innovation Council, government and business will be able to initiate joint research and development projects when costs are too high for individual companies. Sweden's innovative edge will be sharpened through closer cooperation between academia and both large and small enterprises – and through the impetus this generates.

If we want to maintain and enhance our standard of living, then creativity, partnerships and increased productivity is the only way to go.



2. Educating for collaborative innovation

The role of policy in education should not be limited to primary, secondary and tertiary education, but include the development of collaborative innovation capabilities in the business community and among policy-making agencies. Indeed, it is at the firm level that skills and capabilities for collaboration are most needed, and where policy-makers can tangibly contribute. Firms keen to engage in collaborative innovation acknowledge the capability deficit that exists at present to engage in and effectively manage collaborations. The long-term goal should be to create a generation of business leaders who value and support corporate cultures where taking carefully calculated risks linked to innovation is seen in a positive light. Such a vision requires developing businesses' capabilities for innovation management across and beyond Europe, focusing on those skills, capabilities and mindsets that are necessary for creating value from resources beyond the direct control of the firm.

Exposing business leaders to different innovation models, instilling entrepreneurial mindsets in firms and linking business leaders to external sources of advice can be achieved through training seminars, coaching and mentorship programmes for both young firms and established businesses.

A specific area where education and direct support could be provided is intellectual property, particularly for young, dynamic firms. Most young, innovation-intensive companies lack the resources for expert legal advice to assist them in registering their intellectual property or engaging in negotiation with large, established businesses. Nor do they have the time or specialized knowledge themselves. Policy-makers could therefore develop relevant "intellectual property guides" for young, dynamic firms to increase their understanding of this complex regulatory field.

Policy-makers can and do also play an important role in developing knowledge-sharing platforms for management of innovation, and could disseminate knowledge resources specific to building collaborative partnerships. Knowledge sharing is one important approach taken by the European Commission, as described by Commissioner Carlos Moedas below.

Carlos Moedas, Commissioner, Research, Science and Innovation, European Commission

Heads of state and government across Europe recognize that innovation creates jobs and helps tackle societal challenges. That is why it was placed at the core of the Europe 2020 strategy for smart, sustainable and inclusive growth – and why it plays a central role in the new political orientation of the European Commission.

Many types of innovation take place at many levels. But whatever the scale and scope, faster progress is made through effective collaboration. In fact the lion's share of the €80 billion (\$89.9 billion) budget for Horizon 2020, the biggest EU programme to date for research and innovation, will support collaborative activities including major public-private partnerships. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together to stimulate growth and competitiveness.

Many EU Member States implement measures to stimulate innovation but arguably much needs to be done to share the experience more broadly across the Union, which is why the Commission is looking at ways to help circulate knowledge and know-how.

At the EU level, specific measures in Horizon 2020 will enable more effective collaborative innovation by supporting pilot actions, demonstrations and closer-to-market activities. A key focus is on business engagement through targeted support for SMEs and mid-caps. The recent Commission proposal for a €315 billion Investment Plan (\$354 billion) is a very highly leveraged strategy to stimulate investment in large-scale infrastructure projects in areas such as transport and energy technologies where research, innovation and international collaborations are expected to play a significant role.

Innovation is not an end in itself but a process. It's about doing things better, doing things differently, doing new things and, increasingly, it's about doing things together. But at the end of the day we have to ask who benefits. Jean-Claude Juncker at the start of his mandate as President of the European Commission was very clear on this point: it is each and every EU citizen who should benefit from the fruits of innovation, and all Member States and their private and public sectors need to work together to make this a reality.

3. Enabling collaborative innovation

To enable collaborative innovation, the focus should be on providing a legal and regulatory framework that lowers the costs of cross-firm collaboration and on developing the necessary infrastructure. At the national level, this implies the existence of fiscal, licensing and intellectual property regimes that support, or at least do not penalize, collaboration across firms. At the European level, initiatives such as the Digital Single Market and investments in cross-sector innovation are important enabling factors that reduce transaction costs for firms seeking partners and innovating together.

World Economic Forum research indicates that tax, trade and procurement regulations often impact the willingness and ability of young and established firms to explore partnership opportunities. As German Vice-Chancellor Sigmar Gabriel writes below, public-sector funds that support innovation can also be instrumental in encouraging collaborations, while policies around data security and data privacy are critical regulatory elements for building collaborative efforts in the digital economy.

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In Europe with countries of different sizes, we need to get to more European initiatives which bridge country borders. Especially scaling up in smaller countries is a bigger hurdle than in larger countries due to language, legal and other barriers. Therefore a European award on best practices in collaborative innovation supported by heads of state, highly recognized business leaders, representatives from academia and media would be a great initiative to accelerate the speed of building cross-border capabilities along the pillars Prepare, Partner and Pioneer on collaborative innovation.

”

Kai Engel, Managing Director, A.T. Kearney Germany, and Head, Global Innovation Practice

Pier Carlo Padoan, Italy's Finance Minister, outlines how tax policy is being used to support innovation investment in his country, while the government is also directly investing in start-ups through a venture fund. Both of these strategies are part of an ecosystem approach by the government to create an “innovation hub” in Italy, creating numerous opportunities for cross-firm interaction and collaboration.

Finally, Antonio Pires de Lima, Portugal's Minister of Economy, describes how a range of public-sector instruments have supported horizontal collaboration models and practices, helping Portugal achieve a 16-place gain in its competitiveness ranking. These include financial grants for collaborative projects, support for large companies to develop networks of partners and create new companies, and increased effectiveness of the European Innovation System through enhanced alignment between the innovation policies of the EU and its Member States.

“

Governments can foster innovation-driven entrepreneurship through enabling norms in institutions, values in people's mindsets and open spaces for co-creation.

”

Jose Manuel Leceta, Outgoing Director, EITeU, and Visiting Fellow, Robert Schuman Centre for Advanced Studies, European Institute of Innovation and Technology



Sigmar Gabriel, Vice-Chancellor and Federal Minister of Economic Affairs and Energy for Germany

In today's world, innovation is more important than ever. Digitization is spawning disruptive innovations, which is resulting not only in much lower costs but in entirely new business models: ideas are realized in cooperation with customers, business partners and freelance inventors with whom the companies communicate in virtual networks. These open innovative processes are becoming increasingly common and are resulting in shorter and shorter cycles of innovation. Given the increasingly important role that information technology plays in our life, governments need to put in place the right rules and regulations concerning data security, data privacy, standards and secure cloud solutions. In addition to regulatory infrastructure, Germany and Europe need better IT network infrastructure. The German government's "Digital Agenda" strategy gives active support to the digital changes taking place in the private sector, and foresees a nationwide roll-out of high-speed networks.

In addition to promoting innovation in the digital world, the German government is also supporting innovation in small and medium-sized enterprises by providing them access to funds. The Federal Ministry for Economic Affairs and Energy supports R&D projects of small and medium-sized firms. The Central SME Innovation Programme is especially effective as it helps the relevant companies and research establishments with tailored and easy-access grants. This programme also acts as a bridge between many inventors from the research community and the business world.

Innovation is driven by some large, well-known companies like Volkswagen, Bosch and Siemens, and also by a host of small and medium-sized enterprises – the "German Mittelstand" – which are pioneers of technological progress in many fields. Most of these firms work in large or small associations with market-oriented research establishments, such as the Fraunhofer Society. Just recently, Apple head Tim Cook visited a small glass-making firm in Bavaria. He was amazed by what he saw, and said: "They're a world champion in unusual glass-making technology." This "hidden champion" company has worked on sophisticated glass designs for numerous high-profile construction projects around the world. That is typical of these world-beating small and medium-sized firms: no one knows them, but everyone wants them. It is important for companies to have an innovative in-house culture: flexibility, flat hierarchies, openness to debate and cooperation – all of this fosters creativity, new ideas and innovation. After all, we must always remember that innovations are made by people, not machines.

Pier Carlo Padoan, Minister of Economy and Finance of Italy

Innovation will shape the future economy of Italy and Europe. In recent years, Italian companies have been able to become increasingly innovative and acquire a standing in the global economy – specifically companies involved in mechanical engineering, nanotechnology, healthcare and aerospace. These companies often act as "gazelles", autonomously and quickly responding to markets' needs, leading the way through innovation. Embedding innovation in "Made in Italy" is not just a new narrative but is about actions.

The government has approved and implemented a series of actions concerning the Italian business environment in order to let more companies participate in the new "Made in Italy" revolution and to support a "race to innovation" while striving for excellence. We have pushed this change through specific measures within the "Finance for Growth" framework, which focuses on improving access to credit and developing new financing tools, in order to create a better business environment able to attract private capital.

How does our "race to innovation" work? We have designed a bold tax credit strategy, which incentivizes incremental investment in R&D during the period 2015-2019 and the acquisition of new patents. Additional measures have been taken aimed at fostering investment in new machinery, as well as in ultra-broadband so as to fulfil the government's digital agenda. Furthermore, the government has implemented the following measures to enhance an innovation ecosystem: the creation of a crowdfunding platform to help start-ups find liquidity (the first in Europe to be regulated) and a "Welcome Talents" and "Startup Visa" initiative to attract talented people through tax incentives and the fast-track processing of visas and permits for setting up business. As a result of these new policies and regulations, last year almost 100 start-ups registered each month, with a 33% increase in the sector's labour force. Moreover, 8,400 applications for investment financing booked almost all the earmarked funds in just eight months.

SMEs are the backbone of the Italian economy and we are firmly committed to helping them achieve innovation-based growth. Thanks to our new "Investment Compact", innovative SMEs investing in R&D projects get the same benefits as innovative start-ups. Working together with business associations, digital companies and other stakeholders, the government aims at building a nationwide ecosystem of innovating companies and start-ups, fostering new entrepreneurial ideas. Introducing public incentives for companies at different stages of their life cycles is part of the job. A new "Atlas of Italian Innovation" will foster a culture of research and development, where technological progress becomes a natural challenge. This is what we expect for the future of Italy, as we believe that innovation lays the foundation for lasting growth and a sustainable future.

Antonio Pires de Lima, Minister of Economy of Portugal

Globalization, rapid technological advances, heightened competition and the development of new markets for goods and services have forced companies, industries and regions to find sustainable advantages to compete within global value chains. This competitive pressure forces stakeholders to pool innovation resources and share risks with others. Collaborative innovation has played a major role in the recent financial and economic adjustment period, contributing decisively to a structural shift in the Portuguese economy, and driving a significant gain in competitiveness.

Portugal climbed 16 positions in this year's World Economic Forum's *Global Competitiveness Report* to its best-ever standing at 36. We are more competitive because we are more innovative – our best performances are in the innovation and technological readiness areas. We also collaborate more – in the last seven years, the number of companies involved in collaborative R&D projects has quadrupled and the associated public funding increased five-and-a-half times. Portugal is a remarkable example of the impact that collaborative innovation can have across different sectors, industries and regions.

In mature sectors composed of a large numbers of SMEs, Portugal has its best example: the turnaround of our shoe industry is a worldwide case study. A few decades ago, we faced a serious problem due to trade deregulation and Asian competition, but thanks to the leadership and proactive steps taken by the shoe industry association, the technology centre (a cluster of shoe companies), their respective suppliers and research organizations, Portugal has been able to create a strategic partnership that has developed an integrated set of projects and activities over the last 20 years. These have made this sector extremely competitive, specializing in quality leather goods that combine tradition with sophisticated technologies.

In emerging sectors (e.g. nanotechnology and biotechnology) composed of some large companies and countless SMEs, many of them start-ups, it is interesting to highlight the supportive role of our ecosystem in the form of incubation centres operated by, or working in partnership with, research organizations and also large companies. Some examples are UPTEC, IPN and PT (e.g. PT Inovação) in Aveiro.

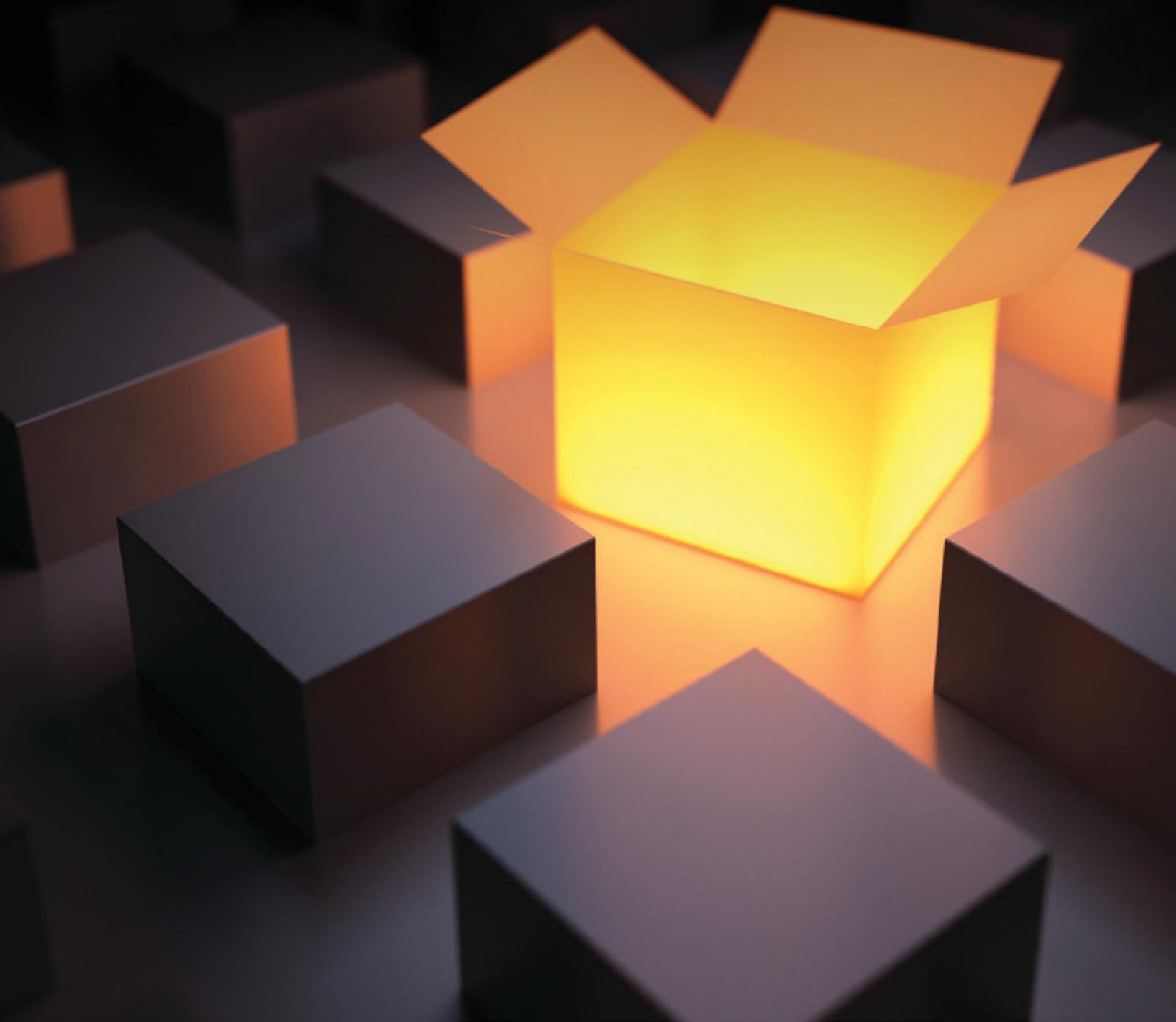
Collaboration models and practices are quite horizontal, and can be replicated across regions and sectors. Supporting instruments that have proved effective include: i) financial grants to collaborative projects in areas such as research and innovation, internationalization, etc. (including preparation of a strategy and road map); ii) dissemination and promotional activities; iii) promotion of technology exploitation and cross-fertilization; iv) support for large companies to develop a network of partners and create new companies; v) implementation of a cluster policy and support for the development of integrated value chains.

At the same time, it is very important to adapt collaboration models to the specific context of each region and/or sector. The work undertaken by regions and countries in the scope of the RIS3 (Research and Innovation Strategies for Smart Specialization) strategies is a step towards these objectives and highlights precisely the potential for cross-sector and cross-region collaboration. A key lever will therefore be the promotion of increased efficiency and effectiveness of the European Innovation System through alignment and complementarity between the policies, programmes and funds of the EU and of nations/regions.

Our vision is to make Portugal an international benchmark for entrepreneurship and innovation. Our commitment to research, technological development and innovation, especially among our SMEs, is a priority for Portugal and we are counting on other stakeholders to increase awareness of Portuguese success stories. In particular, we are counting on the EU to promote the increase in cross-border collaborative innovation efforts and streamline regulations and conditions for the application of European Regional Development Funds.

Section 4

Conclusions and Reflections on the Future of Collaborative Innovation



Conclusion

Innovation-focused partnerships between young, dynamic firms and established companies are only one type of collaborative innovation, yet represent a significant source of potential growth for European firms and economies. Like all collaborations, success requires significant preparation, appropriate partnership models and the ability to adapt and adjust in order to realize the promised value.

Just as it is not just the young and established firms involved in collaborative innovation that benefit from innovation-centred collaboration, it is not just private-sector actors that can influence their success, number and quality. Apart from the important efforts that civil society organizations play in supporting entrepreneurs, policy-makers and political leaders can empower, educate and enable collaborative innovation partnerships in ways that go well beyond regulatory and legislative policy levers.

Europe's fragmented innovation and competitiveness landscape, which increases the challenges facing young, dynamic firms attempting to scale their sales and impact, means that the region has a particular need for and interest in collaborative innovation. It is exciting that there is significant interest and activity already in this space, as indicated by the quotes and case studies highlighted in this report. Clearly, there is opportunity for many European firms and economies to realize the potential of public-private cooperation to spur a wave of innovation that results in the broad-based growth that Europe urgently needs.



How will changes in innovation impact the future business landscape?

Luis Alvarez, Global Services Chief Executive Officer, BT

Compared to a decade ago, there is a marked difference in how innovation is happening in Europe today. We see three key factors in this: a move to true open innovation models; better access to resources and funding; and improved regulatory frameworks, in particular from governments, to foster innovation.

First, open innovation is no longer just an objective but a reality. Most large corporates now have a hybrid technology incubator model to leverage partnerships with agile companies and start-ups. The scale of investments, and the models themselves, can of course vary significantly, but when combined with the rapid rise in the number of start-up accelerators and incubation spaces (of which there are 70 in London alone),²⁸ there is clearly a much richer ecosystem for businesses to tap into.

Second, there seems to be more assured access to resources, and in particular funding, for start-ups as well. According to data from CrunchBase, \$1 billion was invested in UK-based start-ups in the first half of 2014 alone, with some record deals for Europe at around \$100 million.²⁹ While still largely behind US investments, this increased outlay is creating significantly better opportunities for innovation to emerge in Europe and for local partnerships to be formed. The rapidly decreasing cost of certain areas of innovation, such as advancements in cloud hosting, 3D printing and low-cost social media promotion, helps to promote this further.

Third, there are better frameworks across the board to encourage innovation. Governments are taking concrete steps to provide access to public funding, tax breaks for angel investors, platforms for networking and communications, support for start-up incubators and access to talent. Increasing government support for entrepreneurship as part of the educational agenda is also key, and reflects the understanding that a larger proportion of tomorrow's jobs will be self-generated. This must continue through promotion of a multidiscipline curricula, more emphasis on quality STEM (Science, Technology, Engineering and Math) courses, and greater use of social tools for distributed online shared learning.

Europe is well placed to continue to develop its innovation culture through its existing digital fibre infrastructure, which allows smaller entities to have a global reach – for example, to remotely manage virtual project teams and meetings irrespective of the location of their participants. From an educational perspective, this infrastructure allows remote access to the best courses and to interact with other students, and to be as close to innovation sources virtually as students living in Palo Alto. This educational environment will in return encourage students to seek the new types of jobs being created as they transition out of the educational cycle, to the long-term benefit of Europe as a whole.

Giuseppe Zocco, Co-Founder, Index Ventures

Europe's technology scene has for far too long been stifled by constant comparisons with Silicon Valley. Today we'd argue that in a networked global economy, with 3 billion people online, talking in terms of "Europe versus Silicon Valley" is an obsolete comparison. In today's start-up world, it is all about the network and the connection between hubs like London, Paris, New York, Tel Aviv, Berlin and Stockholm, to name a few.

Alongside this fresh thinking, the entrepreneurial climate in Europe is improving. Governments across Europe are increasingly attuned to the transformative power of innovation and are open-minded and accommodating towards start-ups, in a way we haven't seen before. Governments themselves have decided that supporting technology is a primary strategic goal.

Europe has lots of great companies in many sectors that will be disrupted by new, more innovative players. The good thing is that many of these players will come from Europe itself. So this is not so much a comparison between nations (US vs Europe) but rather a battle between generations, which is a healthy innovative trend for industries whether in Europe, Asia or America. Within our portfolio we are seeing great successes on both sides of the Atlantic – of the 11 Index Ventures-supported companies valued at over \$1 billion in the last 12 months, five were European-born (Criteo, Supercell, Just-Eat, King and Zendesk). The great progress made by Europe in recent years has allowed companies like Criteo, King, Just-Eat and Supercell to emerge as global players in a short period of time and to achieve global leadership in their sectors starting from a European base.

Silicon Valley still is and will probably remain for our lifetime the most connected hub in the worldwide technology ecosystem. However, London, Berlin, Tel Aviv, Stockholm, Helsinki and Paris have all become serious hubs in the global entrepreneurial network. Over the past decade, Europe and Israel have been quietly building the next generation of tech giants and many have already emerged as successful public companies. Over the past 10 years, we have seen a huge increase in the number of investors prepared to devote their attention and capital to Europe, from angel investors and micro-Venture Capitalists, to crowdfunding and even public investors. Recently we heard the news that London has deployed a record £1 billion in venture capital in the first nine months of 2014, so it's increasingly clear that the European ecosystem is thriving, putting resources into the hands of those who can use them. That also means that great venture investors have to bring much more than capital to the table – to find partners among the best and most exciting entrepreneurs, European venture capitalists have to be able to help and nurture the growth of the businesses they have backed.

Index's objective was to take the Silicon Valley model of venture investing and adapt it to Europe. A central part of this approach is rooted in providing full-service support to our entrepreneurs to help them succeed. We take being a "full-service" investor very seriously – it is part of our culture and our practice to go the extra mile and to use our network and our resources to support our companies wherever they may need it. Some of the greatest and most interesting companies and teams in the world continue to be based in San Francisco and in the Valley. That's why we have always been active there and opened a San Francisco office a few years ago. At the same time, we were founded on the premise that great ideas and great entrepreneurs can come from anywhere and therefore continue to believe that some of the most disruptive business models will continue to emerge out of Europe.

We are in an age of disruption. We believe that almost every aspect of human activity can and will be transformed by new technologies driven by great entrepreneurial energy and passion. At Index we feel that we are just at the very start of this new era. In June 2014 we launched a new €400 million (\$448 million) fund and we are excited to expand our support for creating new innovative global leaders especially around four key thematic areas: telecommunications, start-ups, networks and financial services. In these sectors, significant innovations are happening at incredible speed – from artificial intelligence and robotics to bitcoin and low-cost consumer investment platforms, to the internet of things, to the growth of marketplaces that are disrupting the way consumers and merchants transact in so many sectors. In addition, there are the many creative ways in which visionary entrepreneurs are leveraging the cloud, big data, security and mobile technologies to transform almost every aspect of our daily lives.

Governments in Europe need to encourage entrepreneurs with global ambitions to establish and grow their companies in their home country, by creating the conditions that make it easy for them to do so. Naturally, being open to new business models and welcoming companies like Uber, Airbnb and other global innovators is critical to being a place that truly welcomes innovation. Equally important for European political leaders is to do whatever they can to attract well-educated, missionary entrepreneurs and to invest in making European cities functional, liveable and exciting places for the young people who will build the companies of the future.

Appendix

Cases of Collaborative Innovation





Firm Name	Firm Description	Innovation Need	Search Method	Collaboration: Structure and Results	Lessons Learned
ABB 140,000 employees	ABB is a power and automation technology company that helps customers improve their operating performance while saving energy.	ABB saw in Solar Impulse the potential to collaborate with a company that shares its vision for sustainable transportation and energy efficiency, to develop new technologies for sustainable mobility.	Solar Impulse initially approached ABB in March 2014, seeking funds for its solar aircraft project. Both parties immediately understood this collaboration could work.	In April 2014, ABB and Solar Impulse established an Innovation and Technology Alliance where ABB provides Solar Impulse with funds as well as three electrical engineers who work full time on the Solar Impulse project and report to the Solar Impulse co-founders.	ABB stressed that there should be a clearly defined objective and task for all partners and businesses involved. To achieve successful results, it is important to have an honest and trust based relationship. The optimal collaboration between Solar Impulse and the other parties involved in the project has been possible because Solar Impulse is fully in charge of leading and managing the project.
Solar Impulse 90 employees	Solar Impulse was founded by two pilots and innovative pioneers with the goal of creating a solar airplane capable of flying around the world powered only by solar energy.	Solar Impulse was looking for a partner with the right technical know-how to boost the aircraft's energy efficiency and provide devices needed for the project.		Solar Impulse and ABB managed substantially increased the power yield and reliability of the energy system, allowing the aircraft to fly longer and more safely. Moreover, the team also created technically-advanced devices for battery charging, which may have potential future applications.	
BT 87,800 employees	BT is a multinational telecommunication services company providing fixed-line, broadband, mobile, networked IT, and TV products and services.	BT was looking for a technology to create a cloud Private Branch Exchange* (PBX) service for the 2 to 25 employee business segment that is operationally and commercially successful. *PBX is a system that connects telephone extensions to the public telephone network and provides internal communication for a business.	In 2014, BT's innovation scouting team in the US sourced a list of cloud-based PBX providers and conducted a short bidding process to select a preferred partner. RingCentral learned about BT's bidding process directly from BT.	BT and RingCentral have a revenue-share contract: RingCentral gives away some of its margin points in order to scale through BT's market. It provides and runs the cloud-based PBX service in the UK, while BT provides sales resources and first-line support. This collaboration has been taking place for over 12 months and is expected to continue. The two companies collaborate on various aspects of the business, such as systems integration, marketing, sales and hardware. This collaboration does not foresee the development of any intellectual property.	BT pointed out that large firms have to be flexible with smaller firms as the relationship is different from the typical supplier-customer contract. RingCentral mentioned that often it is challenging for young, dynamic firms to push back or deny requests from established firms, because they may fear losing the relationship or because they do not have the negotiation capability to do so.
RingCentral 3,000 employees	RingCentral is a provider of cloud-based phone systems for small businesses, which is able to replace traditional phone systems.	RingCentral wanted to expand in the UK. Instead of entering the market alone at substantial expense, it was interested in BT's customer base and brand.			

■ Established firm
■ Young firm

Firm Name	Firm Description	Innovation Need	Search Method	Collaboration: Structure and Results	Lessons Learned
DigitalGlobe 1,200 employees	DigitalGlobe is a commercial vendor of high-resolution satellite images, aerial photos and geospatial content.	DigitalGlobe was looking to further commercialize the images it generates and develop new products. Orbital Insights' algorithms and other data sets would allow DigitalGlobe to reach its goal.	An investor of Orbital Insight approached DigitalGlobe to ask whether a potential collaboration would be of interest.	DigitalGlobe and Orbital Insight established an informational partnership in mid-2014, wherein data belongs to DigitalGlobe and the model to Orbital Insight. This collaboration provides Orbital Insight exposure to a larger audience base and media, and more credibility to venture capitalists interested in investing in the company. DigitalGlobe has the opportunity to further leverage their asset base and bring innovative offerings to their existing and new clients. At this stage, the intellectual property of the predictive model resides with Orbital Insight, which however needs real-time data from DigitalGlobe to create value for its customers. There is a revenue-sharing scheme but DigitalGlobe and Orbital Insights remain two separate legal entities.	These companies highlighted that it is more important to optimize around the speed of product development rather than focusing on near-term revenue. From the perspective of the large firm, it is crucial to communicate internally the added value of partnering, as well as addressing internal concerns over cannibalization. Established businesses have services and resources that can be provided to smaller partners in order to help them thrive.
Orbital Insight 11 to 50 employees	Orbital Insight is a geospatial big data company that leverages satellites and other geospatial data sources to understand and analyse socio-economic trends.	Orbital Insights was looking to access a large imagery database. Moreover, it needed DigitalGlobe's historical as well as constantly updated information to build a predictive model.			
DSM 24,500 employees	Royal DSM is a global science-based company active in the health, nutrition and materials sectors. DSM delivers innovative solutions that nourish, protect and improve performance in global markets.	DSM was looking for more opportunities to provide sustainable solutions in the materials industry in a way that would positively impact the materials supply chain. The market opportunity to produce carpets with materials that can be used and re-used infinite numbers of times is an appealing business for DSM and in line with its vision and strategy.	Niaga approached DSM for the first time in 2011, but it could not get access to the right people. In 2012 Niaga approached DSM a second time through the New Business Development Department of DSM Resins & Functional Materials, triggering enough interest to create a collaboration.	DSM and Niaga first established a regular collaboration agreement in mid-2012, through which DSM provided Niaga with in-kind investments. In this collaboration phase the value of the innovation for DSM became more evident. Throughout the collaboration it became apparent that to bring the technology to the market it was better to create a joint venture, whereby DSM could provide the financial stability to reach stable business. The change from collaboration agreement to Joint Venture took six months. Niaga and DSM have developed seven patent families and five more patents are in the pipeline. The new technology that has been co-developed will be commercially available within 2015.	The large company should be aware of its strengths and weaknesses even before thinking of entering into any collaboration. For instance, DSM is aware of the fact that speed and risk taking are not core strengths. That is why it wants to collaborate with small companies that have high levels of agility and speed. It is essential to have the right mindset and behaviour at multiple levels of management, and especially at the top, to encourage high levels of innovation and collaboration with start-ups and other types of companies.
Niaga 4 employees	Niaga is a Dutch start-up founded in 2010 by two entrepreneurs with the vision of enabling the carpet industry to successfully close the material loop through a fibre-binding technology that allows for materials to be recycled <i>ad infinitum</i> .	Niaga had developed the proof of concept and patented the fibre-binding technology able to produce a carpet that can be made 100% of carpet but was struggling to find the right type of adhesives to facilitate recycling. Niaga needed access to the adhesive, capital, scientific knowhow, and market credibility in order to create a commercially viable solution.			

Firm Name	Firm Description	Innovation Need	Search Method	Collaboration: Structure and Results	Lessons Learned
Invista 10,000 employees	Invista is one of the world's largest integrated producers of chemical intermediates, polymers and fibres. The company is an independently managed, wholly-owned subsidiary of Koch Industries Inc.	Invista was interested in using SilicoLife's development and application of optimization algorithms and proprietary computational and modelling tools to save time and resources by dramatically decreasing the time required to conduct experiments in the lab.	Invista and SilicoLife met several times by participating in industrial biotechnology events in Europe and in the United States.	Following the positive outcome of a short joint project, Invista and SilicoLife decided to sign a long-term agreement in 2013. This collaboration is based on SilicoLife's <i>in silico</i> metabolic engineering solutions, and proprietary state-of-the-art algorithms to find the most efficient pathways between raw material and end product. Any intellectual property that is jointly developed is owned by Invista. The two companies are (and will remain) completely independent – Invista has not made any investment in SilicoLife. This collaboration is expected to last for several years.	Confidentiality is a cornerstone of the collaboration and, at certain stages, it is not possible to disclose anything at all. Also, the small firm needs to understand the larger collaborator's structure and to identify the right person to engage with. That person should be able to see the benefits of the relationship, and be in a position to take decisions on whether to sign a collaboration agreement.
SilicoLife 10 to 15 employees	SilicoLife is a startup that creates computational approaches through algorithms to accelerate R&D and shorten the time-to-market of new biotechnology-based products.	Through Invista, SilicoLife creates proprietary state-of-the-art algorithms, developing further experience and expertise in the field.			
Siemens 343,000 employees	Siemens is a global technology powerhouse focusing on a positioning along the value chain of electrification - from power generation to power transmission, power distribution and smart grid to the efficient application of electrical energy and healthcare	Digitalization is a key strategic initiative for Siemens, which includes Big Data analytics. Siemens evaluated Ayasdi's machine intelligence software because it offers a novel analytical approach that combines topological Big Data analysis with machine learning.	Siemens' global corporate external innovation organization, Technology To Business centre, identified, approached, and evaluated Ayasdi as a candidate for collaboration. Ayasdi successfully completed Siemens' proof-of-concept and secured Siemens as a customer.	Two months ago, Siemens and Ayasdi signed a contract whereby Siemens is utilizing Ayasdi's software within the Corporate Technology Research and Technology Center in Business Analytics and Monitoring in a wide range of use cases to expand deployment both within corporate technology and Siemens' business units. The two companies intend to deepen collaboration so that Ayasdi may be able to help solve additional analytical challenges.	Both companies identified as critical success factors a strong and mutually beneficial need to work together; a common vision of the end outcome; understanding and trying to meet the needs of the other side; and deploying the right teams to execute. Large companies need to systematically analyse the start-up landscape and leverage local innovation ecosystems to get early insights and access to the best start-ups. They could do so by setting up an external innovation group, whose primary role is to work with start-ups and drive collaborations with business units.
Ayasdi 100 employees	Ayasdi provides machine intelligence software to reveal patterns and relationships in complex, high-dimensional datasets that often remain hidden from traditional analytic techniques.	Ayasdi's challenge is to scale up its business quickly by broadening into new market segments. By working with Siemens, Ayasdi wants to validate its software with real world data and have the opportunity to work with a global company in order to expand market presence.			

Endnotes

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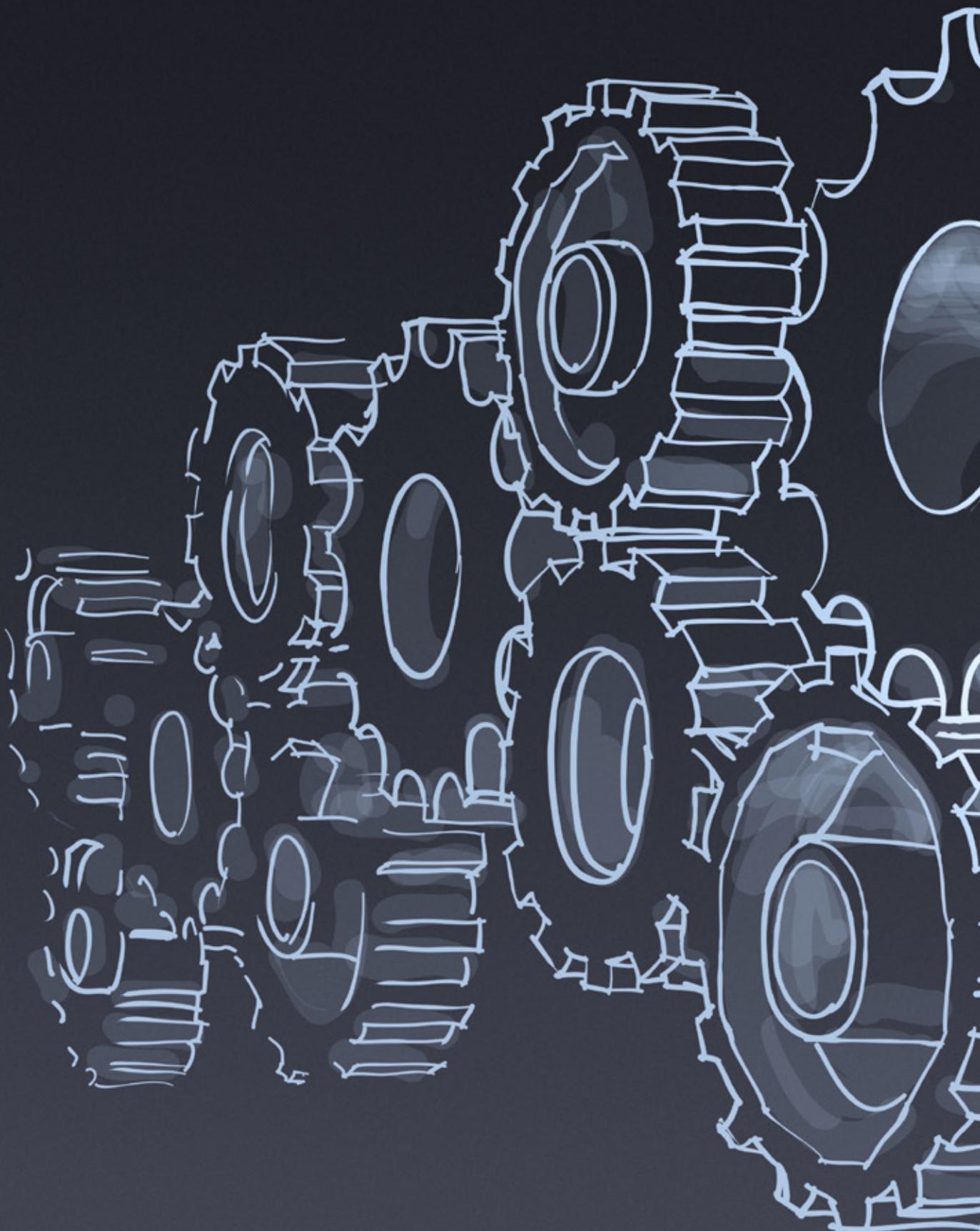
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