LUIZ HENRIQUE DE SÁ ARAKAKI

Selecting a collaboration program with new ventures through enterprise architecture

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Para Mario e Conceição.

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This thesis is dedicated to my family and friends, in Brazil and in Portugal, that have supported me during these two years far away from home. Studying abroad was an easier challenge due your support.

Innovation in an existing company is not just the sum of great technology, key acquisitions, or smart people. Corporate innovation needs a culture that matches and supports it.

Steve Blank

RESUMO

No século XXI observa-se o crescente impacto da inovação disruptiva em mercados que tradicionalmente foram dominados por grandes empresas, por causa de fatores como a democratização da informação, baixo custo de produção e replicação de *software*, redução dos custos de *hardware*, aumento da oferta de capital de risco e outros benefícios causados pelo desenvolvimento tecnológico. A agilidade intrínseca de pequenas empresas, com um número limitado de funcionários, comunicação informal e processos flexíveis, traz uma vantagem competitiva sobre as grandes empresas que sofrem com sua rigidez organizacional. Nesse contexto, grandes empresas, burocratizadas e focadas em eficiência, buscam transformações para fomentar a inovação necessária para o sucesso. Uma das formas encontradas para aliar a eficiência operacional corporativa com a agilidade, flexibilidade e inovação de startups é por meio de parcerias. A criação de silos de empreendedores dentro do contexto corporativo em de programas de colaboração como aceleradoras, incubadoras, fundos de *venture capital*, dentre outros, são formas de fomentar o ambiente empreendedor dentro de grandes corporações. Este trabalho busca estudar os modelos de parceria existentes e definir um método para a seleção do modelo mais adequado às necessidades de uma empresa. O trabalho foi desenvolvido em parceria com a LoriComm, uma empresa de telecomunicações, com operação em Portugal, licenciada para fornecer a tecnologia de telecomunicações para Internet das Coisas LoraWAN, que busca parcerias com *startups* para o desenvolvimento de um ecossistema de empresas tecnológicas voltadas à Internet das Coisas, consumindo sua infraestrutura. Entretanto, com o crescimento do interesse de grandes empresas em fazer parcerias com startups, diversos modelos de parcerias emergiram, como aceleradoras corporativas e fundos de venture capital corporativos. Para que esse método seja construído, é desenvolvido um modelo de adição de valor dos programas de colaboração, sustentado por uma extensiva revisão bibliográfica em conceitos de visão baseada em recursos, competências fundamentais e competências dinâmicas da teoria de gestão estratégica de empresas. Com base nesse modelo, constrói-se uma tipologia dos programas de colaboração existentes. Essa tipologia caracteriza os programas em três dimensões: objetivos, elementos de design e recursos e competências. Este estudo descreve 8 modelos de programas em 22 subcategorias.

Após essa pesquisa, constrói-se um método de seleção de programas de colaboração, estruturado sobre a teoria de arquitetura empresarial, em que são modeladas as vistas de realização de objetivos, estratégica e de realização de competências em Archimate 3.0. Com esse método, é possível relacionar elementos de negócio, como recursos e competências adquiridas por meio de programas de colaboração, com elementos de estratégia fundamentais para o sucesso da empresa no longo prazo. Por fim, o método é aplicado ao caso da LoriComm e seus resultados são apresentados.

Palavras-Chave: Gestão da inovação. Programas de colaboração. Vista baseada em recursos. Competências dinâmicas. Arquitetura empresarial. Startup.

ABSTRACT

In the beginning of the XXI century, there is an intense impact of disruptive innovation in markets usually dominated by large corporations. There are many causes to this phenomenon, such as the information democratization, software production and replication costs, reduction of hardware costs, increase of venture capital offer and other benefits of the technologic development. The agility of small firms, with a limited number of employees, informal communication and flexible processes, brings a competitive advantage over large companies that suffer from organizational rigidities. In this context, large companies immersed in burocracy and focused on operational efficiency, look for transformations to support innovation. One way to combine the agility and flexibility of new ventures with the operational efficiency of large companies is through partnerships. Collaboration programs, such as accelerators, incubators and venture capital funds, bring the innovation culture from startups to companies. This research describes the existing collaboration models and defines a method to select the most suitable for the organization needs. The work was developed in partnership with LoriComm, a portuguese telecommunications company, with operations in Portugal. LoriComm is licensed to offer the LoRaWAN Internet of Things network in Portugal and supports IoT startups in Portugal. To develop the method, a value-adding model is developed using strategic management theory: resource-based view theory and dynamic capabilities. Based on this mode, we develop a program typology, characterizing each program model in three dimensions: objectives, elements of design and resources and capabilities. It describes 8 programs in 22 sub-categories. This typology supports the method, developed following enterprise architecture theory, using Archimate 3.0 as notation. Using this method, it is possible to connect business elements, resources and capabilities with strategic elements. After that, the method is applied to the LoriComm case and the results are presented.

Keywords: Innovation Management. Collaboration Programs. Resource-based view. Dynamic capabilities. Enterprise architecture. Startup.

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1 INTRODUCTION

1.1 MOTIVATION

The term Creative Destruction is credited to the Austrian-American economist Joseph Schumpeter on the *Capitalism, Socialism and Democracy* masterpiece (Schumpeter, 1942). Schumpeter concluded that entrepreneur-driven growth would lead to economic progress, what in the context of the capitalist society, means turmoil. In the beginning of the 21st century, we face a large entrepreneurship boom (Kelley, Singer and Herrington, 2015; Eddy, 2016). The turmoil materializes in several indicators, such as the average tenure of companies on the S&P500 index. In 1965, firms stayed in average 33 years on the index, in 2012 this number dropped to 18 years and it is predicted to go as low as 14 years on 2026 according to Innosight (Innosight, 2016) as seen in Fig 1.

Recently, Richard Foster and Kaplan revisited Schumpeter's theory on modern practices of innovation management (Foster and Kaplan, 2011) and concluded that the life span of a corporation is defined on the balance of three management practices: 1) running operations effectively; 2) creating new businesses which meet customer needs; 3) shut down business that no longer meet company standards for growth and return. The issue is that innovation practices needed to create new businesses often conflict with operational effectiveness of the current business. The study of this conflict resulted on the research area of *organization ambidexterity,* the term was first used by March in 1991 (March, 1991) and popularized by Tushman and O'Reilly who defined it as the "organization's ability to simultaneously pursue both incremental and discontinuous innovation, hosting multiple contradictory structures, processes and cultures within the same firm" (Tushman and O'Reilly, 1996).

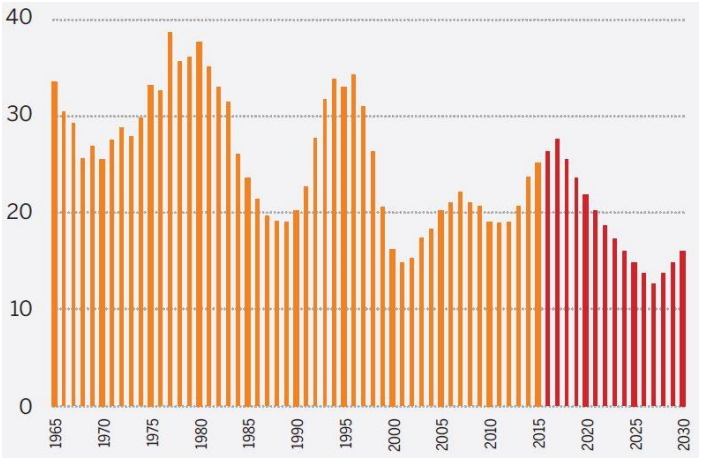


Figure 1. Average company lifespan on S&P 500 Index in years. **Source:** (Innosight, 2016)

The conflict is extensively studied on the literature and compiled by Tushman and O'Reilly, Raish and Birkinshaw (Raisch and Birkinshaw, 2008; O'Reilly and Tushman, 2013). The pursuit of incremental innovations, small improvements in their existing products and operations that let them operate efficiently and deliver even more value to customers, is denominated exploitation, and the search for discontinuous innovation, radical advances that deeply alter the basis for competition in an industry, is called exploration (O'Reilly and Tushman, 2004). The conflicts between the two paradigms are detailed in the table 1.

Table 1. Conflicts of the ambidextrous organization. **Source:** (O'Reilly and Tushman, 2004)

Alignment	**Exploitative Business**	**Exploratory Business**
Strategic intent	Cost, profit	Innovation, growth
Critical tasks	Operations, efficiency, incremental innovation	Adaptability, new products, breakthrough innovation
Competencies	Operational	Entrepreneurial
Structure	Formal, mechanistic	Adaptative, loose
Controls, rewards	Margins, productivity	Milestones, growth
Culture	Efficiency, low risk, quality, customers	Risk taking, speed, flexibility, experimentation
Leadership role	Authoritative, top down	Visionary, involved

On the other side, new ventures are thriving on innovation. Young companies heavily based on innovation, such as Tesla and Salesforce.com, have an innovation premium of more than 75%, meaning that 75% of the companies‘ market value comes from predicted growth in cash flows (Dyer, 2016). The democratization of information and technology, easier access to resources lead to an entrepreneur boom. The entry costs for a startup is lower than ever, building a virtual product, such an app costs almost nothing. Accessing markets is even easier with social media and reduced distribution costs (Zwilling, 2013).

However, new ventures are, in general, highly dependent on external resources, such as financing and business expertise (Jarillo, 1989; Hellmann and Puri, 2000). With traditional corporations falling behind on innovation and new ventures starving for resources, partnerships are established. Corporations are more than ever partnering with entrepreneurs (Griffith, 2016). Innovation contests are omnipresent (Bullinger *et al.*, 2010), several corporations founded corporate venture capital funds to foster internal and external ventures (CB Insights, 2015) and corporate accelerators are booming (Kohler, 2016).

The development of new venture support programs and open innovation initiatives created multiple program models. Innovation managers have a tough decision-making process to select the most suitable program for their specific needs, as this collaboration brings both advantages and disadvantages in the long-term (Maula and Murray, 2000; Hellmann, 2002). This work aims to fulfill a gap in the literature, the missing comparison model between programs and a method to select the most suitable program for the company’s needs. The developed comparison model and selection method are applied in LoriComm, a portuguese Internet of Things telecommunication company, to deal with unexpected variables.

1.2 LORICOMM

LoriComm is a Portuguese telecommunication firm focused on the Internet of Things (IoT) technology. The company was founded by the entrepreneurs and leaders of an IoT startup named EddyHome. Based in Ontario, Canada, EddyHome developed an IoT water monitor to control water flows in cities. The main product, Eddy IQ Meter is installed in the main water connection of a house or apartment and can monitor water usage, watch for leakages, compare usage and cost, and control the water inflow. All

information is connected to a smartphone application. Another product, the Eddy H2O Sensor can be installed in any water point of the house, such as a shower or a washing machine, to control individual water flow.

EddyHome sells its products to municipalities and individuals. However, to connect the device to the internet, the engineering team has tried several technologies, from LTE to Wi-Fi. As the device is usually installed in hard access spots, it should operate without a direct energy connection, with a standalone battery. The standard connection protocols consume high levels of energy, requiring recharging in a regular basis. During the research, the team discovered the LoRaWAN technology.

LoRaWAN is a media access control layer protocol for managing communication between Low-Powered Wide-Area Networks (LPWAN). This technology provides a low bit rate connection with low power consumption.

While the LoRaWAN network provides 0,3 to 50 kbit/s and consumes 40mA, WiFi provides 11 to 72Mbit/s and consumes 320mA. Besides that, the connection range also differs. A LoRaWAN antenna reaches 15km of range in a rural area, while WiFi maximum range is 250m.

LPWANs perform great for IoT devices that need small amounts of data transfer and non-real-time applications. The Eddy IQ Meter battery lasts for approximate 10 years. However, the LPWAN infrastructure should be built from scratch, as it cannot use existing antennas of 2G or 3G.

This is the main product of LoRa Alliance and its competitor SigFox. They provide and manage LPWAN infrastructure. LoriComm is the LoRaWAN provider in Portugal, they manage the LoRaWAN infrastructure in Lisbon and Oporto.

In this work, the student applied the developed method in the LoriComm context. The research motivation came from the innovation manager from LoriComm, Henrique Mamede, who was facing issues to select a collaboration program with startups for his company and approached professors of Instituto Superior Técnico and collaboratively they proposed a thesis to solve it. LoriComm agreed to open the necessary information for the research.

1.3 DOUBLE DEGREE PROGRAM

The student developed this work during a two-year double degree program, in the Polytechnic School of the University of São Paulo (USP) and Instituto Superior

Técnico of the University of Lisbon (UL). The work was developed in Portugal, in the context of the Portuguese entrepreneurial and innovation context.

The benefits of the double degree program are perceived in the complementary knowledge developed on both schools. From the Polytechnic School of USP the student developed much of his business sense, product development, innovation management and general business administration knowledge required for this work. In Instituto Superior Técnico of UL the student studied strategic management and modeling in several notations, such as Business Process Management Notation (BPMN) and Archimate 3.0. This theoretical background was essential to the research development.

1.4 RESEARCH METHODOLOGY

This research follows the Design Science Research Methodology (DSRM) (Hevner, March and Park, 2004; Peffers *et al.*, 2007). DSRM is an outcome-based methodology, focusing on the development, functional performance and improvement of artefacts. Artefacts are broadly defined as constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototyped systems). This work develops a model and a method. The DSRM process includes six activities: motivation and problem identification, solution objectives definition, design and development, demonstration, evaluation, communication.

The design and implementation of an artefact in an organizational context have different performance of conceptual models. This phenomenon is studied by behavior science research and can be related to the intention of artefact use and perceived usefulness, impact on individuals and organization (DeLone and McLean, 1992; Seddon, 1997; Delone and McLean, 2003). The misalignment of theory and practice motivates the instantiation of the solution in a real organization to evaluate the benefits of the proposed model and method, therefore we apply the artefacts on a real organization.

DSRM is adequate for this work since it aligns proactivity on the solution design with organizational context. This alignment is essential to this research, as the solution requires theoretical foundation as well as organizational acceptance.

The process for this work is illustrated in **Figure 2** and on the list:

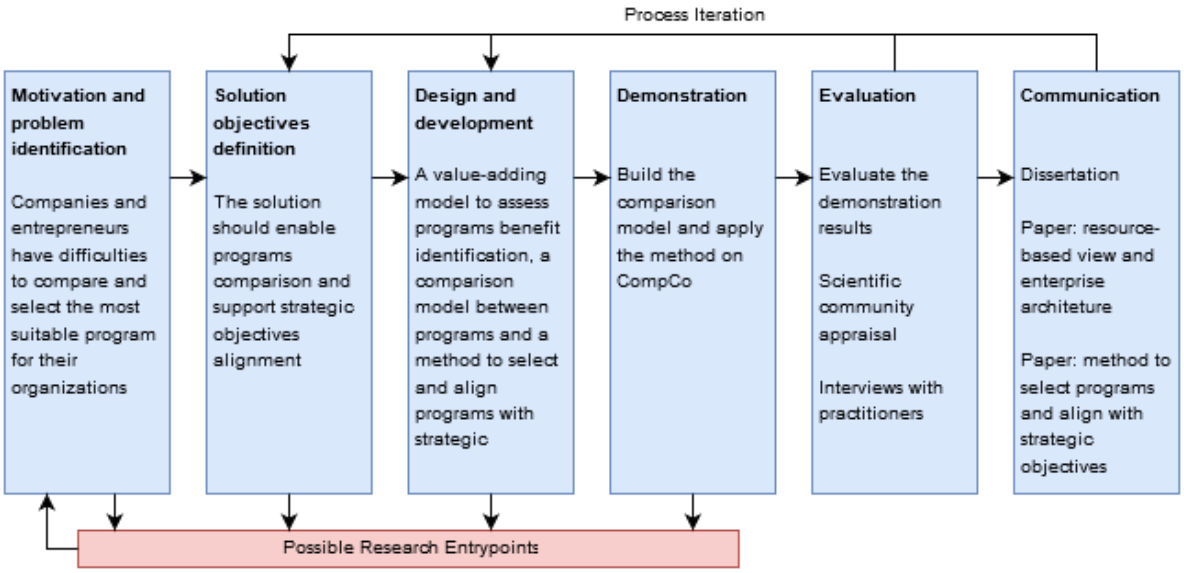


Figure 2. DSRM mapped to this work. **Source:** (Peffers *et al.*, 2007)

1. Motivation and problem identification: Introduction (chapter 1) provides a context overview and problem motivation. Related Work (chapter 2) describes the state-of-art knowledge regarding the problem space. Problem (chapter 3) defines the specific research problem and its boundaries.
2. Solution objectives definition: Proposal (chapter 5) describes the solution objectives and requirements.
3. Design and Development: Theoretical Background (chapter 4) specifies the theoretical framework for the solution. Value adding-model, Program Typology and Selection Method aggregates the state-of-art knowledge with the theoretical framework to build a solution for the problem (chapter 5).
4. Demonstration is presented on chapter 6, with the application of the artefacts in a real organization.
5. Evaluation is described on chapter 7.
6. The conclusion (chapter 8) summarizes the findings and provides directions for further research.

2 RELATED WORK

Open innovation and entrepreneurship are active areas of research. The open innovation paradigm was established in 2003 by (Chesbrough, 2003). Since then, intense research was made to understand the shift of the dominant logic of research and development (R&D) from internal discovery toward external engagement (West *et al.*, 2014). Discoveries in this field identified two main mechanisms that encourage innovation creation outside the firm. The first is providing extrinsic (monetary) (Terwiesch and Xu, 2008) or intrinsic (recognition) incentives (West and Gallagher, 2006). The second is providing formal tools and processes that provide a platform for external innovators to build and possibly share innovation (Gawer and Cusumano, 2013). The two mechanisms can be combined to drive better results.

This section describes the state-of-art knowledge regarding open innovation and entrepreneurship, the prominent corporate open innovation programs that aggregates the mechanisms previously mentioned: innovation contest, corporate accelerator, corporate incubator, venture builder, and corporate venture capital and independent new venture support programs, such as accelerator, incubator, and venture capital. The reviewed references provide an overview of programs and source of information for further analysis with the theoretical background of chapter 4. Lastly, we define the phases of a business lifecycle, useful to categorize startups and achieve a deeper analysis level.

From now on, we refer to open innovation initiatives and new venture support programs as programs. This term aggregates the following initiatives: innovation contests, corporate and independent accelerators, corporate and independent incubators, venture builders, corporate and independent venture capitals.

2.1 OPEN INNOVATION

Open innovation is the paradigm that companies can combine inflows of knowledge to accelerate internal innovation and outflows of knowledge to expand the markets for external use of innovation (Chesbrough, Vanhaverbeke and West, 2006). Open innovation transactions enable companies to commercialize complementary assets (West and Bogers, 2014). These assets can be traded in form of technology sourcing and acquisition (Arora, Fosfuri and Gambardella, 2001), strategic alliances

with external suppliers (Narula and Hagedoorn, 1999) or a collaborative R&D (Peck, 1986).

This new marketplace leverage companies in the main aspects of its business models: they create more value, by taking advantage of many more ideas externally conceived and they capture greater value by using the firm's key assets more effectively (Chesbrough, 2012). Cooperation on innovation can help companies overcome certain organizational conflicts detailed on the organizational ambidexterity theory (O'Reilly and Tushman, 2004).

These new transactions involve at least two actors: an actor that acquire innovation and an actor that supplies innovation. In many times, a third actor also participates, the broker. In this work, we focus on open innovation partnerships between entrepreneurial startups and established companies, that might be mediated by a broker (an intermediary company that handle the program organization). Entrepreneurial startups may be a valuable source of innovation, due to its different resources and capabilities (Dushnitsky and Lenox, 2005).

2.2 PROGRAMS

New venture support programs emerged from the necessity of new ventures to access resources, such as infrastructure and capital. From office space and venture capital, programs evolved into complex value proposition logic, offering, beyond physical and financial resources, intangible resources, such as knowledge and reputation. The firsts known programs were funded by governments in non-profit incubators in 1980's. Later, with the open innovation trend, mature companies began to develop open innovation programs.

Open innovation programs are the interface between established companies and external innovative actors such as startups, entrepreneurs, scientists, students and professors (Nesta, 2015b). A well designed corporate open innovation program should combine companies' resources and capabilities with the speed, flexibility, and knowledge of small startups and teams. There are several programs with distinctive features (Nesta, 2015a, 2015b). In the next sections, we provide an overview of the research on the available programs, from corporations and independent institutions.

2.2.1 Innovation contests

An innovation contest (IC), also known as hackathon (Financial Times, 2015), innovation tournament, idea competition, is a competition in which a company (seeker) facing an innovation problem publish the problem for a population of independent agents (solvers) and provides an award to the agent that generates the best solution (Terwiesch and Xu, 2008). ICs can be executed by the seeker or by a broker. The contest stimulates innovation through monetary incentives (the award) and recognition (competition titles, competition enjoyment) (Adamczyk, Bullinger and Möslein, 2012).

The literature review of (Adamczyk, Bullinger and Möslein, 2012) compiles 201 publications and define design elements of programs, research perspectives, notable publications, main findings and research gaps. This papers and its references are the main sources of information about ICs.

2.2.2 Independent accelerators

Independent accelerators execute limited duration (usually 2-6 months) programs to cohorts of startups, helping them with the new venture process. Besides cooperation between teams (Cohen, 2013), acceleration programs offer workspace, intense mentorship, functional support, access to funding and other supporting activities to foster startup survival. An acceleration program comprises at least five main features (Nesta, 2012):

- An open, competitive application process;
- Provision of pre-seed investment, usually in exchange for equity;
- Focus on small teams rather individuals;
- Time-limited program with scheduled events and intense mentoring (2-6 months);
- Cohort or classes of startups rather than individual companies.

The research of (Cohen, 2013) and reports from (Nesta, 2012) provide the big picture of accelerators, showing design elements, business models, benefits and costs for participants and institutions.

2.2.3 Corporate accelerators

Corporate accelerators (CA) develop acceleration programs with an interface between a company and startups (Kohler, 2016). CA provide similar services of an independent accelerator but have different objectives. While independent accelerators have financial objectives, generating revenues charging fees, exchanging equity or incorporating a percentage of earnings, CA have also strategic objectives, such as market exploration or technological development.

Corporate acceleration programs might result in a range of collaborations:

- Corporation supports pilot project;
- Corporation becomes startup customer;
- Corporation becomes distribution partner;
- Corporation invests in startup;
- Corporation acquires startup.

Research from Kohler (Kohler, 2016), Heinnemann (Heinemann, 2015), and Potito (Potito, 2015) describe the operations and evolution of CAs, with design elements, benefits for corporations and startups and differences between corporate and independent accelerators.

2.2.4 Independent incubators

Business incubators became widespread in the 1980s and 1990s. Primarily providing office space (Lalkaka and Jack, 1996) for small companies in an open office logic and then expanding to supporting services as lack of business knowledge was identified as an important barrier to new firms‘ success (Bruneel *et al.*, 2012).

According to the (European Union, 2010), incubation concerns the support given to the entrepreneur from the startup to the growth phase. This is usually a mid-term process, lasting from one to five years. During the program, support can be provided in form of capital, mentoring, training, and office space. After the program, the incubated firm should have an established customer base and growing revenue.

Incubation programs are similar to acceleration programs, the main difference is the duration and intensity of support. While incubation programs last between 1 and 5 years, acceleration programs have a shorter duration, between 2 and 6 months. Incubators also deliver less intense mentorship, focusing on networking and resources.

Generally, incubation programs target growth stage ventures, with developed product and sales, while acceleration programs also support businesses in the startup phase.

Independent incubators are well researched on the literature, recent papers such as (Mian, Lamine and Fayolle, 2016) provide a review on the main literature findings, (Wiggins and Gibson, 2003) researched the incubator ecosystem in the United States and wrote a case study. (Bergek and Norrman, 2008) developed a best-practice framework to incubators. These materials are helpful to identify the benefits, costs, design elements and a historical evolution of incubators.

2.2.5 Corporate incubators

Corporate incubators (CI) are specific sector incubators that provide incubation services to ventures aligned with corporate objectives. Leveraging resources from parent organization and cooperating with internal or external startups, CIs enhance corporation's technology base to support its overall development and growth (Gassmann, 2006).

The main advantage of CIs is its access to corporate resources, such as capital, expertise, branding, and networking. Corporations can benefits from incubation programs in similar ways of corporate accelerators.

The main works on CIs are from (Becker and Gassmann, 2006a, 2006b; Gassmann, 2006), this research provides analysis on resource-based view approach, network effects and university partnerships. (Ford, Garnsey and Probert, 2010) studied a technology incubation unit in Philips.

2.2.6 Venture builder

Venture builders (VB), also know as company builders, startup studios, venture factories and startup factories, are companies that develop parallel several startups, sharing common resources (Köhler and Baumann, 2016). In this program, the venture builder participates in the business lifecycle until maturity, when it can spin-off to a standalone firm or disinvested through an acquisition (Bergfeld, 2015).

The program creates startups as a repetitive process, with shared resources supporting the startup portfolio and dedicated teams developing each project (Majewski, 2016). Expa, a venture builder, is, according to its founder, a shared

services platform. They provide all the resources needed by a company to scale. The objective is to take bureaucratic duties off the founder responsibility. Notable cases of venture builders: Betaworks, Rocket Internet (case-study (Köhler and Baumann, 2016)), Drukka (studied on (Szigeti, 2016a)). To innovate, these companies partner with entrepreneurs (Betaworks, eFounders, Drukka) in exchange for equity or copy existing business models (Rocket Internet).

2.2.7 Independent venture capital

Independent venture capital (IVC) organizations raise money from individuals and institutions for investment in early-stage businesses that offer high returns potential but high risks (Sahlman, 1990). Beyond providing capital, IVCs conduct strategic guidance for the firm. IVCs often influence the selection and dismissal of senior managers, indicate board members and foster networking with relevant actors (Hellmann and Puri, 2002).

IVCs are well studied from many perspectives, such as financial, management, and innovation. Research from (Kortum and Lerner, 2000; Lerner, 2012) and (Gompers, 1996; Gompers and Lerner, 2001) study the impact of venture capital to firm's innovation and new venture development. The report by (Fundação Getúlio Vargas, 2005) describes the industry in Brazil.

2.2.8 Corporate venture capital

Corporate venture capital (CVC) funds are structured as subsidiaries of corporations and operate similarly to independent venture capital funds (Chemmanur, Loutskina and Tian, 2014), although there three main differences: CVCs have longer investment horizons, not enforced by funds rules as in IVCs. CVCs pursue both financial and strategic objectives of the parent company. And least, the performance compensation structure of IVCs (i.e., 2% management fee, 20% of exceeding results), is not found in CVCs, where managers usually earn a fixed compensation combined with corporate bonuses.

Potential strategic benefits for corporations from corporate venture capital (Maula, 2001):

- Market-level learning
- Venture-specific learning

- Indirect learning
- Options to acquire startup
- Options to enter new market
- Leveraging own technologies and platforms
- Leveraging own complementary resources

CVCs research by (Maula and Murray, 2000; Maula, 2001) and (Chemmanur, Loutskina and Tian, 2014) study the value-adding mechanisms of CVCs and its benefits and costs to corporations and new ventures. The value-adding model based on resource-based view, knowledge-based view and endorsement is the basis for the value-adding model of this work.

2.3 BUSINESS PHASES

A business lifecycle can be divided into phases with different needs and characteristics (Filardo, 1994). In each phase, businesses have access to different resources, perform distinct processes and excel on diverse capabilities. For startups, several frameworks are proposed (Chen, 2014; Blank, 2015; Brown, 2015; Startup Commons, 2015). In this work, we define four phases: idea phase, startup phase, growth phase and maturity phase, see Fig 3. In this work, these categories are useful since each startup support program is targeted to a specific business phase.

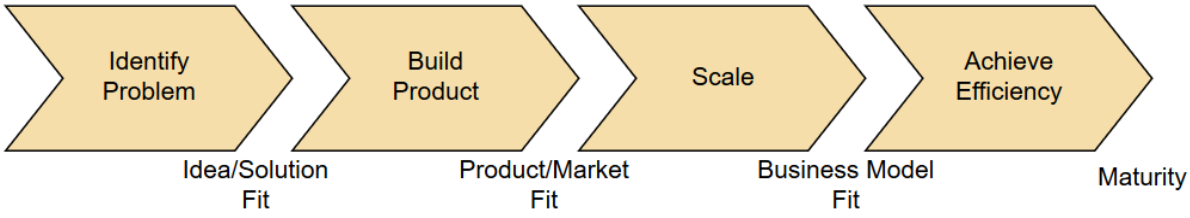


Figure 3. Business phases (Blank, 2015)

Problem and Solution Fit – Idea Phase

On this phase, entrepreneurs identify a problem with market potential and have initial ideas of solution and value proposition. Information gathering activities are conducted to learn about the problem and market. An operational prototype is developed to test the solution and prove demand.

Product Fit – Startup Phase

The main objective of this phase is improving the product and finding customers willing to pay for it. With a validated prototype, the team iterates and tests assumptions about the solution and market. Initial key performance indicators are identified and tracked. A startup can attract investment. In the end of this phase, sales channels and customer base are established.

Business Model Fit – Growth Phase

The objective of this phase is to validate the business model, achieving positive cash flow. To generate profit, the firm starts to look at company building beside product development. Management specialists are hired, formal processes are defined, an organization structure is built. Scalability issues appear.

Maturity Phase

In this phase, business grows at lower or even negative rates. The company looks for new markets, develop new products and face strong competition. Efficiency becomes central to management strategic objectives. Processes are improved and matured. Bureaucracy and organizational rigidity emerge.

3 RESEARCH PROBLEM

In the previous section, we defined important concepts of the problem space and reviewed open innovation and new venture support programs. Now, we define the specific research problem that this work proposed solution solves.

Based on the literature review, programs are a way that companies can follow to deal with the organization conflicts emerged from the exploration and exploitation logic (Raisch *et al.*, 2009; Chesbrough, 2012). Partnership with startups and entrepreneurs conceive a natural organizational separation of actors. This alliance can lead to a combination of extensive resources and capabilities of established companies with complementary resources from entrepreneurs, resulting in an innovation enabled organization configuration (Kohler, 2016).

New ventures benefit from support programs accessing valuable resources, knowledge, and endorsement from independent firms, such as venture capitals and accelerators. They also might benefit from the extensive resource pool of mature companies.

There is extensive research on programs, presented with different foci, such as innovation perspective, economic perspective, management perspective (Adamczyk, Bullinger and Möslein, 2012). Some comparison is made between models (Nesta, 2015a). However, even with proved benefits from different program models, companies have limited resources and, therefore, execute programs respecting its organizational and financial constraints. On the other side, engaging in a program requires resources from new ventures, such as equity or time. Companies and entrepreneurs lack a structured comparison framework to assess the impact of each program in their organization perspective, leading to difficulties in program selection.

In short, this research addresses the following problem: **there are several new venture support program models and open innovation initiatives available, either to startup engagement and for company execution, both lack a method to select the most suitable program for their organizations.**

4 THEORETICAL BACKGROUND

Entrepreneurs and innovation managers have different concerns when engaging or executing a startup support program. The theoretical background of this work provides an overview of relevant theories to understand the characteristics, benefits, and costs of diverse programs, as well as tools to align strategic objectives with programs.

The value-adding model is based on the resource-based view, knowledge-based view and endorsement. To relate strategy, resources, and actors, we use enterprise architecture, following the TOGAF Architecture Development Method with Archimate notation, using the motivation extension, strategy elements, and business layer.

4.1 VALUE-ADDING MECHANISMS

To fully understand the benefits of startup support programs and open innovation initiatives to companies and startups, we use a value-adding mechanisms model (Maula, 2001). The model is the foundation to understand how partnerships lead to competitive advantage and firm survival. This model embraces three perspectives: resource-based view, knowledge-based view, and endorsement.

4.1.1 Resource-based view

The resource-based view (RBV) of the firm describes how corporations achieve competitive advantage through core resources and capabilities (Wernerfelt, 1984; Barney, 1991). In contrast to industry-wide analysis (Porter, 1985), RBV aims to identify competitive advantage sources inside the firm, in an internal view. Resources are core to the firm if they meet, at least partially, four conditions: the resources should be valuable, rare, inimitable, and non-substitutable (VRIN).

Resources are defined in generic terms as input through which the corporation can perform operations and create economic rents (Grant, 1991). Resources can be classified into six main categories: financial, physical, knowledge (further detailed on knowledge-based view), and reputational resources (Barney, 1991; Grant, 1991).

An important concept in RBV is capability, that is defined as what a firm can do as result of teams of resources working together (Grant, 1991). Capabilities are also

called by distinctive competencies or core competencies (Snow and Hrebiniak, 1980; Prahalad and Hamel, 1990). Grant proposes a resource-based approach to strategy analysis, see Fig 4.

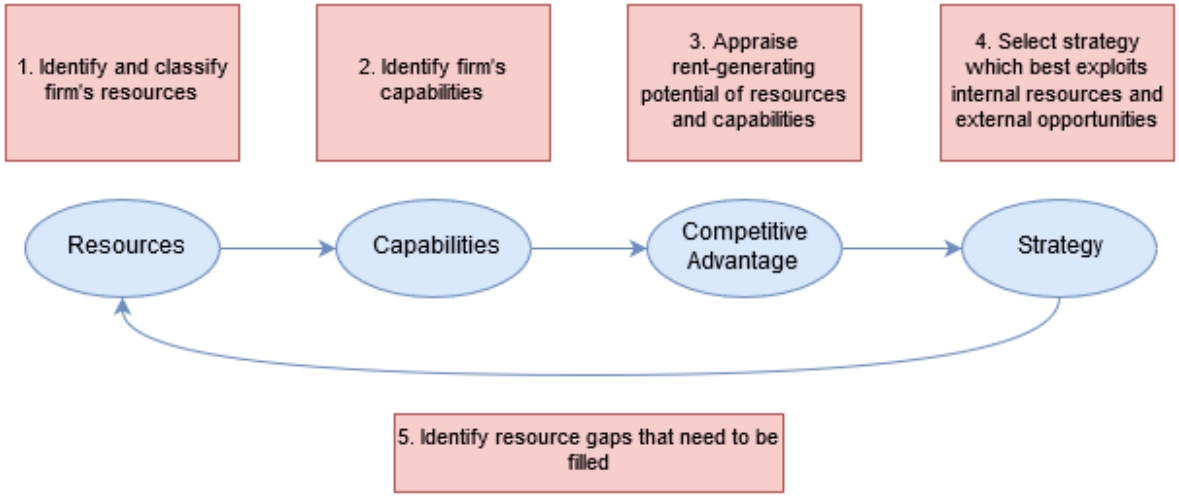


Figure 4. Resource-based approach to strategy analysis. **Source** (Grant, 1991)

Firms in highly competitive markets have vulnerable strategic positions due to low margin and difficult product differentiation. In these cases, strategic alliances and cooperation can enable them to share specific resources and costs, which outweigh the disadvantages of alliance formation (Eisenhardt and Schoonhoven, 1996). Also, partnerships improve the market power of a firm, because the partner is a customer for the product or because they share distribution channels or buying power.

The firm's processes that alter its resource base to match or create market change are called dynamic capabilities (Eisenhardt and Martin, 2000). A process that integrates resources, such as product development is a dynamic capability. The resource reconfiguration process is necessary, but not sufficient to maintain a competitive advantage.

Resource complementarity

The complementarity concept of (Harrison *et al.*, 1991) changed the mindset of acquisitions. They argued that firms gain a competitive advantage on acquisitions when accessing complementary resources. The combination of resources opens new opportunities, leading to economies of scope, while similar resources lead to economies of scale, that are only achieved with high degree of integration (Hitt *et al.*, 1998).

Further research expanded the complementarity concept from acquisitions to strategic alliances (Harrison *et al.*, 2001). If a high level of uncertainty exists, strategic alliances are preferred to an acquisition, because alliances provide more strategic flexibility and may reduce risk (Kogut, 1991; Hitt, Keats and DeMarie, 1998; Wright, Hoskisson and Busenitz, 2001; Hoskisson and Busenitz, 2002). New ventures are important sources of VRIN complementary resources, several studies analyse startup support programs thought the resource-based view theory perspective (Maula, 2001; Gassmann, 2006; Alvarez and Busenitz, 2007).

4.1.2 Knowledge-based view

The knowledge-based view of firms is an extension to the resource-based view theory. This perspective distinguishes knowledge as the strategically most significant resource of the firm (Grant and Grant, 1996). According to this view, heterogeneous knowledge bases and capabilities between firms are determinants of sustained competitive advantage (DeCarolis and Deeds, 1999). Therefore, knowledge creation, transfer, and combination open new opportunities. Learning and knowledge acquisition are important motivations for inter-organizational relationships (Hamel, 1991; Inkpen, 1996).

In this work, we focus on complementary knowledge. While startups typically focus on a specific technology and product, large corporations have a broader view and more experience (Maula, 2001). Technology based startups have deeper knowledge about technology and products. Disruptive startups also have the expertise in unexplored markets. On the other side, companies have extensive business and operations expertise, information about competitors and customers.

Empirical studies (Lane and Lubatkin, 1998; Yli-Renko, Autio and Sapienza, 2001) on knowledge transfer in inter-organizational collaborations are vital to understanding the importance of knowledge flow in startup supports programs.

4.1.3 Endorsement

Besides transferring resources and knowledge, startup support programs, as inter-organizational collaboration, also influences the other’s perception of the new

venture capability (Baum, Calabrese and Silverman, 2000; Stuart, 2000; Stuart and Sorenson, 2007).

These works list three social mechanisms that lead to reputation improvement of a new venture in partnership with recognized companies:

1. As relationships have reciprocal effects on reputation. Partners are selective in establishing relationships with new ventures;
2. Companies have capabilities to evaluate the quality of new ventures and therefore select new ventures with a minimum quality standard;
3. Established companies are in a relative good strategic position, enabling selection of partners in a large pool of alternatives.

As brand recognition is hard to build, companies are afraid to damage it with partnerships. In this way, endorsement of established companies is beneficial for a new venture, improving its capabilities perception among investors, customers, and other partners.

4.1.4 Conclusion of value-adding mechanisms

We conclude the literature review modeling the value-adding mechanisms of startup support programs. The model used the value-adding mechanisms of (Maula, 2001) and resources typology of (Gassmann, 2006), see Fig 5. The value-adding mechanisms hypotheses were validated to corporate venture capital in empirical analysis. In this work, we extrapolate the model beyond corporate venture capital, since the mentioned startup support programs of this work have similar value-adding mechanisms of corporate venture capitals.

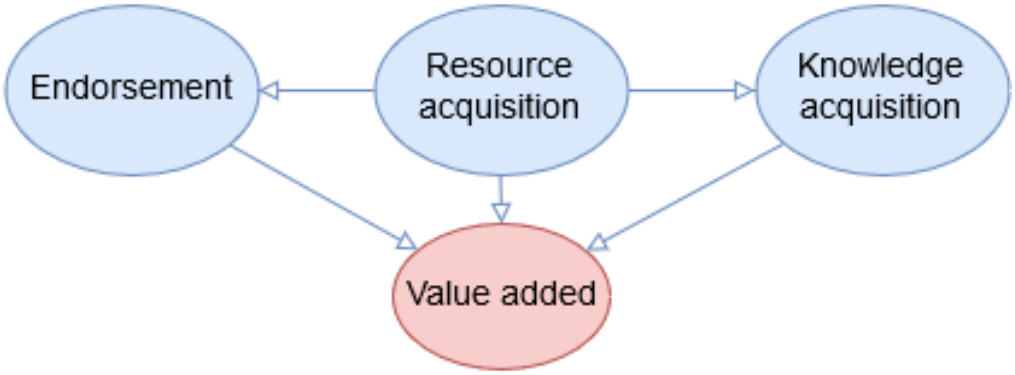


Figure 5. Value-adding model. **Source:** (Maula, 2001)

4.2 DYNAMIC CAPABILITIES

Dynamic capabilities are the abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker (Zahra, Sapienza and Davidsson, 2006). This concept complements the resource-based view approach to corporate strategy, which emphasizes the deployment and protection of VRIN resources (McEvily, Eisenhardt and Prescott, 2004). In the dynamic capability approach, companies create and manipulate resources to develop new capabilities.

The approach is especially relevant regarding entrepreneurship, as it comprehends how small firms and new ventures develop new capabilities and acquire new resources. Entrepreneurs often face challenges that are not within the firms' repertoire routine (Moorman and Miner, 1998a, 1998b; Christensen and Raynor, 2003). This scenario demands actions that change the firms' capability configuration through a learning process.

The literature covers four learning processes for organizations: imitation, improvisation, trial-and-error, and experimentation (Miner, Bassof and Moorman, 2001). Improvisation and trial-and-error are the major learning processes for new ventures, while experimentation is more adopted by mature companies (Zahra, Sapienza and Davidsson, 2006). The speed of change in capabilities is greater in trial-and-error and improvisation than in experimentation (Zahra, Sapienza and Davidsson, 2006).

Companies in certain markets are more sensible to dynamic capabilities, these markets have the following characteristics:

- Open international commerce;
- Technological change is systemic and can be combined to develop new product solutions;
- Well-developed global markets for the exchange of (component) goods and services;
- Markets where exchange of technological and managerial know-how is inefficient.

  According to (Teece, 2009), dynamic capabilities can be disaggregated into three components:

  1. The capacity to sense and shape opportunities and threats (sensing);

2. Seize the identified opportunities (seizing);
3. Enhance, combine, protect and reconfigure assets to maintain competitiveness (managing threats and reconfiguration).

4.2.1 Sensing

Opportunities get detected by the enterprise because of two factors:

- Entrepreneurs can have differential access to existing information (Israel, 1973);
- New information and new knowledge can create opportunities (Schumpeter, 1942).

To identify and shape opportunities, enterprises must constantly scan, search, and explore across technologies and markets, both “local” and “distant” (March and Simon, 1958; Nelson and Winter, 1982).

R&D is too often usually a manifestation of “local” search. “Local” search is only one component of relevant search. In fast-paced environments, with a large percentage of new product introductions coming from external sources, search/exploration activity should not just be local. Enterprises must search the core as well as to the periphery of their business ecosystem. Search must embrace potential collaborators—customers, suppliers, complements that are active in innovative activity. Partnerships with startups fit in this capability, being way to scan changes in fast-paced environments.

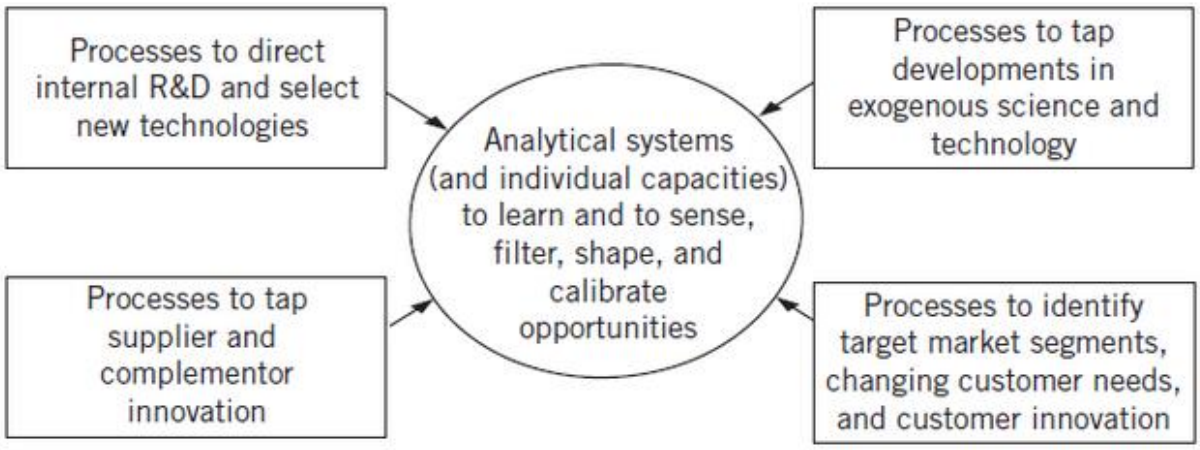


Figure 6. Sensing related capabilities. **Source:** (Teece, 2009)

Collaborations with startups transfer their dynamic capabilities to the company. Each collaboration program accesses the sensing capability in a diverse way. To select the most appropriate program, the company should realize which sensing capability it

is searching and match with the new ventures that provide this capability. Fig 6 displays a summary of the sensing capability.

4.2.2 Seizing

Once a new (technological or market) opportunity is sensed, it must be addressed through new products, processes, or services.

Addressing opportunities involves maintaining and improving technological competences and complementary assets and then, when the opportunity is ripe, investing heavily in the technologies and designs most likely to achieve marketplace acceptance.

In short, managers need to make unbiased judgments under uncertainty around not just future demand and competitive responses associated with multiple growth trajectories, but also around the pay-offs from making interrelated investments in intangible assets.

The design and performance specification of products and the business model employed, all help define how the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit.

Many of the related capabilities to seizing have conflicts with organizational rigidities presented on the organizational ambidexterity paradigm. Partnering with startups and developing open innovation programs are a way to overcome the conflicts of exploration vs exploitation logic.

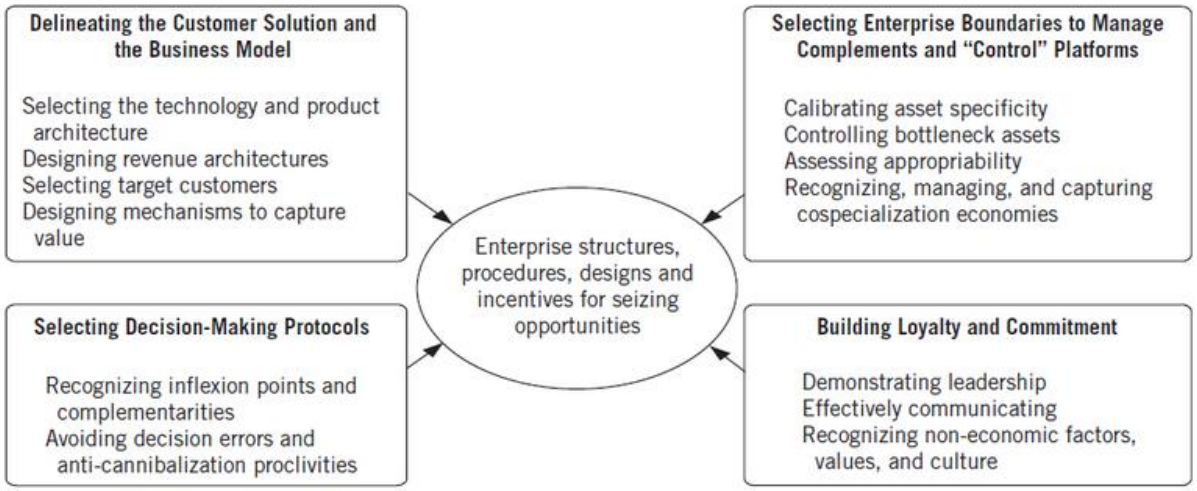


Figure 7. Seizing related capabilities. **Source:** (Teece, 2009)

Like the sensing capability, startups perform the seizing capability in a different way of stablished companies. With flexible decision making structures and culture, startups offer a complementary dynamic capability to companies. To select the most suitable program, companies should identify which seizing dynamic capabilities they are missing and match with startups that provide these capabilities. Fig 7 displays a summary of the seizing capability.

4.2.3 Managing Threats and Reconfigurations

Success will breed some level of routine, as this is necessary for operational efficiency. Routines help sustain continuity until there is a shift in the environment. Changing routines is costly, so change will not be (and should not be) embraced instantaneously.

Organizational rigidity leads to innovation inhibition. Therefore, decentralization ultimately foster innovation.

Partnerships with startups provide an indirect benefit to this dynamic capability. Although the collaboration does not fulfil directly one capability, the diverse culture and organizations of startups are potential examples and influencers for changing the corporate culture. Fig 8 displays a summary of the managing threats and reconfiguration capability.

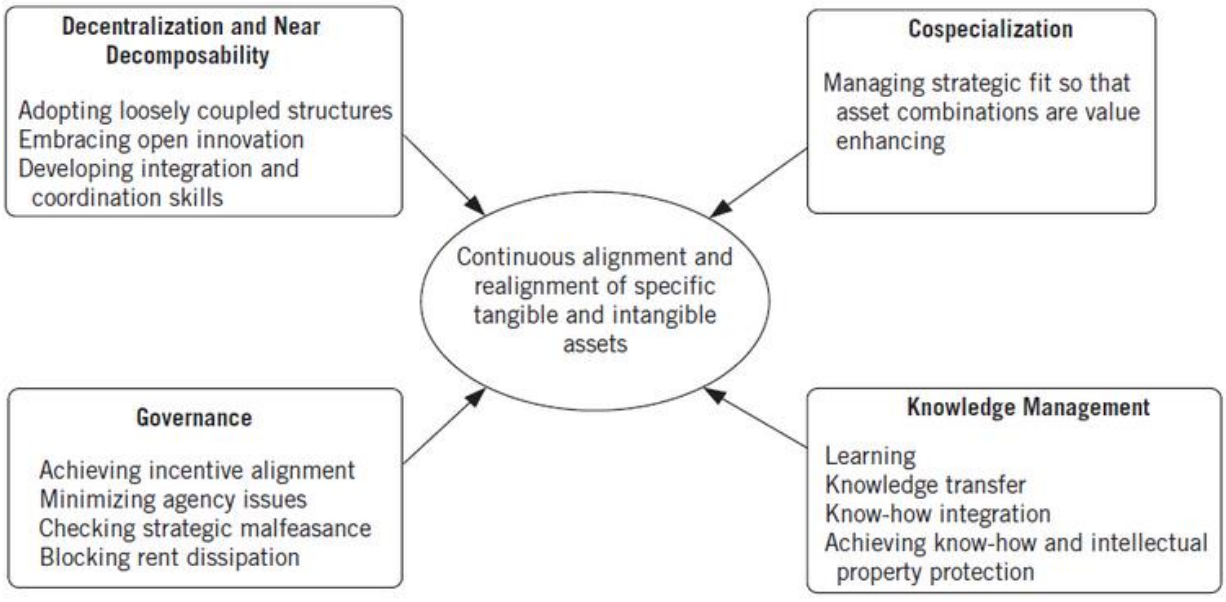


Figure 8. Managing threats and reconfiguration related capabilities (Teece, 2009)

Dynamic capabilities, per se, do not lead to superior performance (Eisenhardt and Martin, 2000), as it depends on the quality of the capabilities they change; however, the capacity of fast resource creation and reconfiguration improve firm's performance, especially in dynamic markets (Teece, Pisano and Shuen, 1997), where more ventures are founded. Again, there is complementarity between new ventures and established companies. We use dynamic capabilities as an extension of the value-adding model of **Figure 5**.

4.3 ENTERPRISE ARCHITECTURE

(Lankhorst, 1998) defines Enterprise Architecture (EA) as a "coherent whole of principles, methods, and models that are used in the design and realization of an enterprise's organizational structure, business processes, information systems, and infrastructure". Although the EA provides a holistic view of the firm, it differs from business models as it captures the essential structure beyond the business model value proposition.

The main purpose of EA is to integrate different architectural domains of the firm such as process, application, product, technical, and informational (Jonkers *et al.*, 2006). In order to achieve readability and organization on a broad range of components, EA relies on a hierarchical, multi-level and multi-view approach, reducing the number of artefacts per model (Mesarovic, 1970; Schekkerman, 2016).

Most frameworks differentiate EA on the following layers (Winter and Fischer, 2006): business, process, integration, software and infrastructure (technology), architectures. The development of EA frameworks such as the TOGAF ADM proved useful in assessing enterprise changing and evolution, providing a unified view of the components and relationships of the firm and generating insights about how changes impact the entire system (The Open Group, 2009).

4.3.1 Archimate 3.0

Archimate is a visual modelling language for EA that enables enterprise architects to describe, analyse and visualize the relationships between architecture domains. It is detailed on the Archimate 3.0 Specifications (The Open Group, 2016b). The framework is divided into layers and aspects.

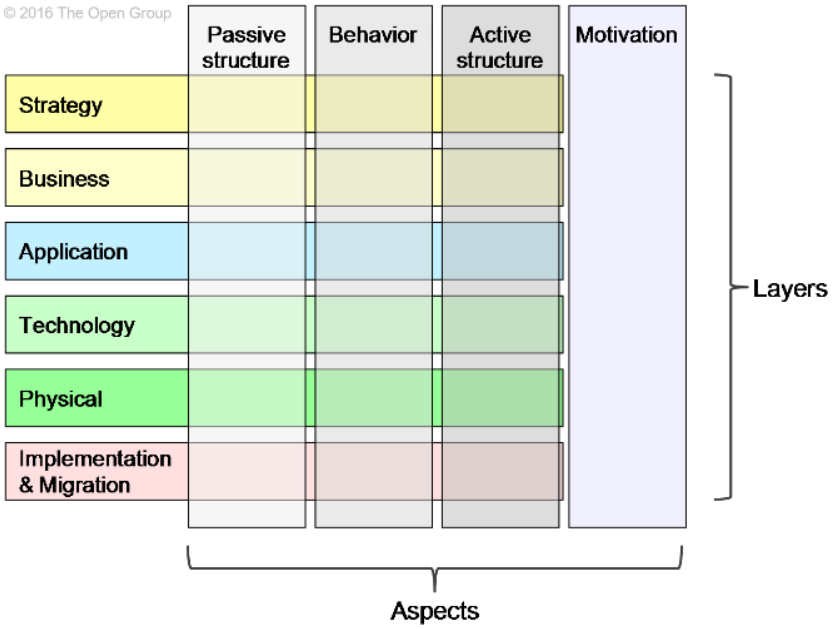


Figure 9. Archimate 3.0 full framework (The Open Group, 2016b)

For the scope of this work, the analysis is limited to the strategy elements, motivation extension and business layers and its aspects. Since the other layers have few or none relevance for the object of study.

An Archimate model is composed of concepts that are specialized on elements, relationships, and relationships connectors.

The next sections detail the elements and relationships connectors relevant for this work.

Relationship connectors

Relationships connect a predefined set of source and target concepts (usually elements, but in a few cases, also other relationships). The exact meaning of many relationships depends on the source and target concept that they connect. Archimate relationships are detailed on the table 2.

Table 2. Relationships connector definitions and notations. **Source:** (The Open Group, 2016a)

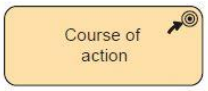
Structural Relationships		Notation
Composition	Indicates that an element consists of one or more other elements.	
Aggregation	Indicates that an element groups a number of other elements.	
Assignment	Expresses the allocation of responsibility, performance of behavior, or execution.	
Realization	Indicates that an entity plays a critical role in the creation, achievement, sustenance, or operation of a more abstract entity.	
Dependency Relationships		**Notation**
Serving	Models that an element provides its functionality to another element.	
Access	Models the ability of behavior and active structure elements to observe or act upon passive structure elements.	
Influence	Models that an element affects the implementation or achievement of some motivation element.	+/-
Dynamic Relationships		**Notation**
Triggering	Describes a temporal or causal relationship between elements.	
Flow	Transfer from one element to another.	
Other Relationships		**Notation**
Specialization	Indicates that an element is a particular kind of another element.	
Association	Models an unspecified relationship, or one that is not represented by another ArchiMate relationship.	
Junction	Used to connect relationships of the same type.	(And) Junction Or Junction

Elements

As this work generates a comparison model between startup support programs and develops a method to align strategic objectives with resources, we use the strategy elements, motivation extension, and business layer.

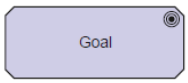
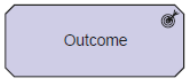
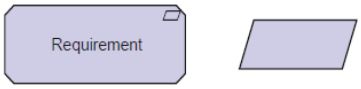
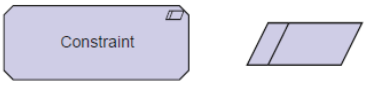
We use three strategy elements on our method: resource, capability, and course of action. Detailed on table 3.

Table 3. Strategy elements definitions and notations. **Source:** (The Open Group, 2016a)

Element	Definition	Notation
Resource	An asset owned or controlled by an individual or organization.	
Capability	An ability that an active structure element, such as an organization, person, or system, possesses.	
Course of action	An approach or plan for configuring some capabilities and resources of the enterprise, undertaken to achieve a goal.	

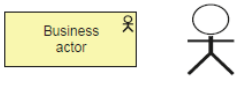
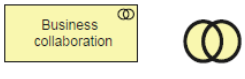
From the motivation extension, we use four elements: goal, outcome, requirement and constraint. Detailed on table 4.

Table 4. Motivation elements definitions and notations. **Source**: (The Open Group, 2016a)

Element	Definition	Notation
Goal	A high-level statement of intent, direction, or desired end state for an organization and its stakeholders.	
Outcome	An end result that has been achieved.	
Requirement	A statement of need that must be met by the architecture.	
Constraint	A factor that prevents or obstructs the realization of goals.	

The Business Layer is typical to model the business architecture of an enterprise, defined as a description of the structure and interaction between the business strategy, organization, functions, business processes, and information needs (The Open Group, 2016b). We use the business actor and business collaboration elements, detailed on table 5.

Table 5. Business layer elements definitions and notations. **Source:** (The Open Group, 2016a)

Element	Definition	Notation
Business actor	A business entity that is capable of performing behavior.	
Business collaboration	An aggregate of two or more business internal active structure elements that work together to perform collective behavior.	

Viewpoints

Views are a mechanism to purposefully convey information about architecture areas. A view is defined as a part of an Architecture Description that addresses a set of related concerns and is tailored for specific stakeholders. A view is specified by means of a viewpoint, which prescribes the concepts, models, analysis techniques, and visualizations that are provided by the view.

This work makes use of the following viewpoints:

Goal Realization Viewpoint: This viewpoint comprehends the goal, requirement, constraint and outcome elements. It allows refinement of high-level goals into more tangible goals;

Strategy Viewpoint: This viewpoint aggregates the course of action, capability, resource and outcome elements. This viewpoint models a high-level view of the company's strategies, capabilities and resources supporting those, and the envisaged outcomes;

Resource Map Viewpoint The resource map viewpoint is useful to provide an overview of the enterprise resources and bundle them in categories. This viewpoint includes the resource element;

Capability Realization Viewpoint: This viewpoint allows the creation of a structured overview of the capabilities realization and resources assignment of the enterprise. In this work, this viewpoint is used to map actor's capabilities and assigned resources. This viewpoint includes resource, capability, business actor and business collaboration elements;

4.3.2 The Open Group Architecture Framework Architecture Development Method (TOGAF ADM)

The Open Group Architecture Framework Architecture Development Method is a process for developing enterprise architectures (The Open Group, 2009). It is a comprehensive method including nine phases developing architecture at multiple levels: from strategy and motivation to physical and technological.

In this work, we use only a small fraction of TOGAF, mainly the Architecture Vision phase and a partially the Business Architecture phase. The viewpoints detailed

in the previous section is useful to support the architectural development promoted by TOGAF ADM. Fig 10 displays the TOGAF phases used in this work.

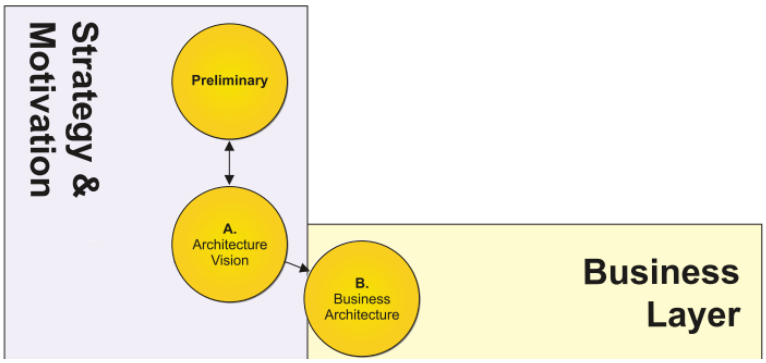


Figure 10. TOGAF ADM on this work. Adapted from (The Open Group, 2016a)

Preliminary phase Ensure commitment of sponsors and stakeholders define architectural principles.

Architecture vision Validate business goals, define requirements and constraints, identify existent capabilities.

Business Architecture Define capability realization and resource map baseline. Design capability realization and resource map target. Identify business behaviour supporting target capability realization view.

5 SOLUTION PROPOSAL

This section explains the proposal to solve the problem defined in chapter 4. The first subsection describes the solution objectives and is followed by a detailed description of the proposal.

5.1 OBJECTIVES OF THE SOLUTION

The objectives of this proposal are defined in Table 6.

Table 6. Solution objectives

Solution objective	Objective's rationale	Question related
Build a value-adding model of programs	Theoretically supported model to assess the benefits of programs	How programs improve the performance of my company?
Define a comparison model between programs	Identify differences between programs, from new ventures' and companies' perspectives	What is the difference between programs?
Develop a method to select programs and align with strategic objectives	Following an enterprise architecture approach, relate programs with strategic objectives	Which is the optimal program for my specific need?

Therefore, we build three artefacts to solve each solution objectives. The detailed description of each artefact is in the next section.

5.2 VALUE-ADDING MODEL

As the problem states that the literature lacks a method to select and align programs with strategic objectives, we first need to understand the characteristics of each program, mainly the benefits, costs, risks and design elements. Holding this information, we can proceed to develop a method to solve the problem.

The benefit is the most complex attribute, demanding the conceptualization of the mechanisms that enable value addition through programs. In the literature, we found several works assessing value addition through programs, focusing both on the company and the new venture perspective (Narula and Hagedoorn, 1999; Maula, 2001; Gassmann, 2006; Toschi, 2009; Chemmanur, Loutskina and Tian, 2014). Resource-based view theory is repeatedly used to explain benefits of partnerships. In this work, we use the empirically validated model of (Maula, 2001). However, we extend the model with dynamic capabilities, since the model misses contemplating the dynamic nature of resources configuration of new ventures and established firms. As detailed in the theoretical background section, dynamic capabilities are necessary competencies from companies to sustain competitive advantage and are accessible through acquisitions and partnerships. Besides that, we add the resources typology of (Gassmann, 2006) to relate resources with capabilities, dynamic capabilities and value.

Therefore, our model includes dynamic capabilities influencing capabilities that are realized by resources. The model is illustrated in **Figure 11**.

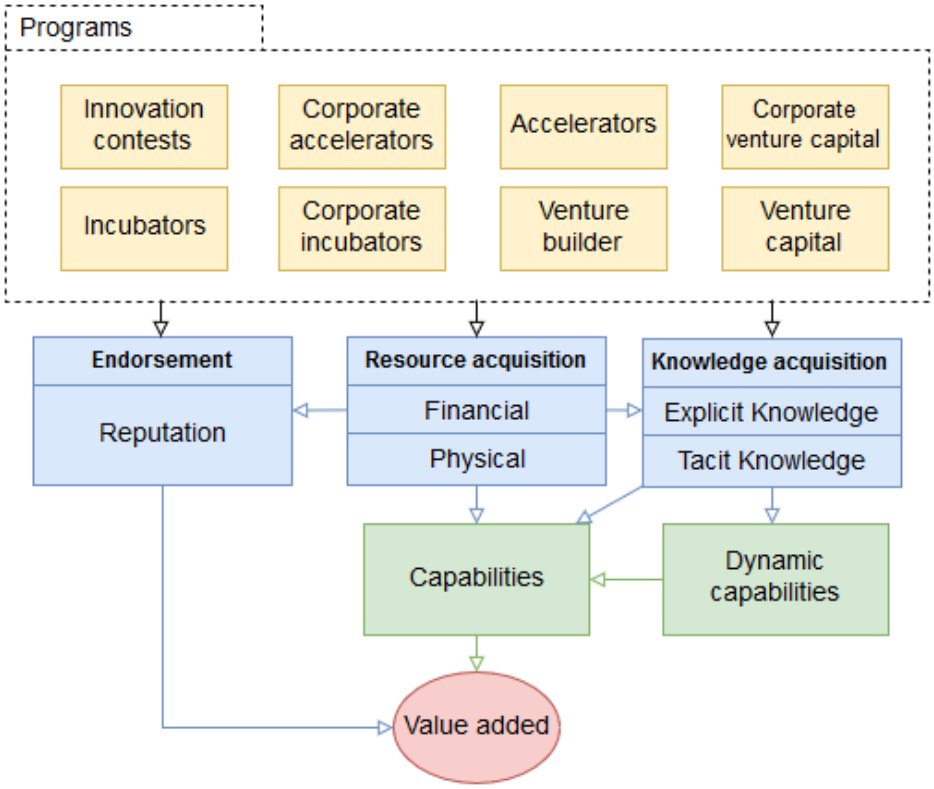


Figure 11. Extended value-adding model (based on (Maula, 2001; Zahra, Sapienza and Davidsson, 2006))

Companies and startups benefit from partnerships through resources and capabilities transfer. The strategic objectives achievable through partnerships are supported by resources and capabilities. To select the most suitable program, we identify the transferable resources and capabilities for each program and relate to strategic objectives achievable through open innovation initiatives.

5.3 PROGRAM TYPOLOGY

The second artefact is the typology of collaboration programs. This typology is built to characterize the existent models based on three dimensions: objectives, design elements, and resources and capabilities. The information was gathered from the literature on corporate accelerators (Kanbach and Stubner, 2016) and structured using the same dimensions and tools, providing a single table with comparison enabled.

After what, we detail each model into its types, forming the comparison table. This table contemplates the main elements needed in the selection method: objectives, requisites and constraints, and resources and capabilities.

5.3.1 Dimensions

To characterize collaboration programs, we define analysis dimensions. Gathered from the literature review, we divide the program dimensions into three groups.

1. Objectives
2. Design elements
3. Resources and capabilities

5.3.2 Objectives

The first dimension to characterize support programs are the objectives, which define the rationale behind all design elements. Each program has a primary objective and additional objectives, that support the main program rationale.

In our typology, objectives are detailed in four categories: primary objective, main objectives, derived objectives and additional objectives.

Primary Objectives

Companies engage in partnerships with startups either to achieve strategic objectives, financial objectives or a mix of both.

Financial Objectives

Companies generate financial returns collaborating with startups adding value to their partners in exchange of a revenue stream. Companies typically add value to new ventures providing capital, coaching, networking, technology, expertise and/or infrastructure. In exchange, startups grant companies with equity, a percentage of earning and/or fees.

In corporation-startups collaborations, financial gains are usually necessary to program sustainability but are almost always combined with strategic objectives. In the other hand, to independent institutions, financial gains are commonly the ultimate objective.

Strategic Objectives

Collaborations can also lead to strategic objectives achievement. There are several strategic objectives that can be achieved through collaborations. To define objectives, we use dynamic capabilities and the familiarity matrix. With this analysis, we derive four main objectives and from these, we define more four derived objectives.

We model strategic objectives in Archimate to relate objectives with the necessary resources and capabilities for its achievement. Based on the value-adding model presented on the previous section, we use resource-based view and dynamic capabilities to understand how startups complement companies' resource base.

Characterization in the Familiarity Matrix

The familiarity matrix is a 2x2 matrix with the market or problem in one axis and the solution or technology in another axis. This matrix has three quadrants where new knowledge can lead to innovation, each representing a possible strategic objective (Roberts and Berry, 1984). Fig 12 displays the matrix.

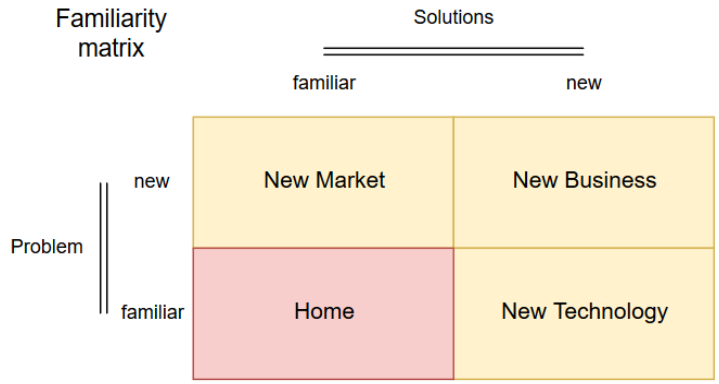


Figure 12. Familiarity Matrix. **Source:** (Roberts and Berry, 1984)

- New technology: in this quadrant, companies are looking for new technologies or solutions for existing problems and markets. Relevant on markets where technology development can deeply impact the industry. Companies contribute with market knowledge, while new ventures build novel solutions to existing problems.
- New Market: in this area, companies look for new markets where current expertise could be used. To allow exploration of new markets, companies should disclose technologies to sensible entrepreneurs (internal or external), who can find new implementations for its solutions.
- New Business. This quadrant refers to an unknown area for the company, here the company cannot leverage existing technologies or market knowledge, but can use management expertise and networking to foster innovation outside the core business.

Based on these three quadrants, we define the four main objectives on partnerships:

Main objectives

Develop new technologic capabilities (1). Companies can partner with startups that develop technology in related areas to explore new technology trends, test specific technologies or acquire technology without recurring to traditional R&D practices. With collaboration, companies reduce costs and risks of developing new technologies. On the other side, companies have reduced control over partner startups. In this kind of collaboration, companies access the *sensing dynamic*

capability, namely the research and development capability of the partner, as modelled on Fig 13.

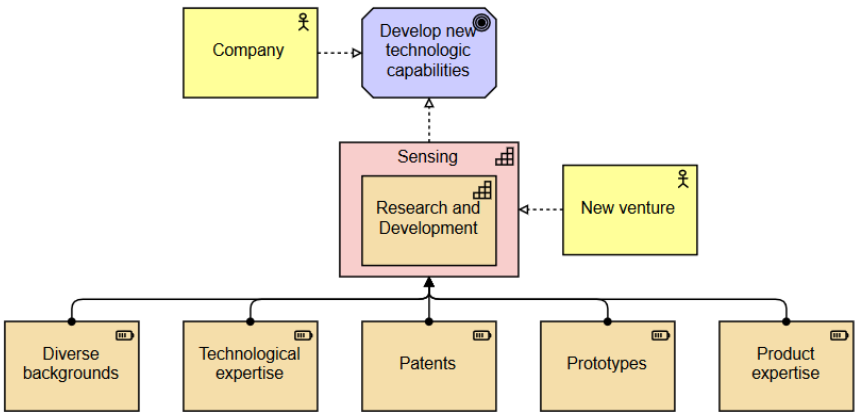


Figure 13. Model of “Develop new technologic capabilities” objective

Identify and understand the needs of new markets (2). Companies can partner with entrepreneurs and startups to leverage current technology in new markets. In this case, the company is looking to a different set of resources, focused on market and customers. The main dynamic capability accessed is again *sensing*, focused on customer development, as modelled on Fig 14.

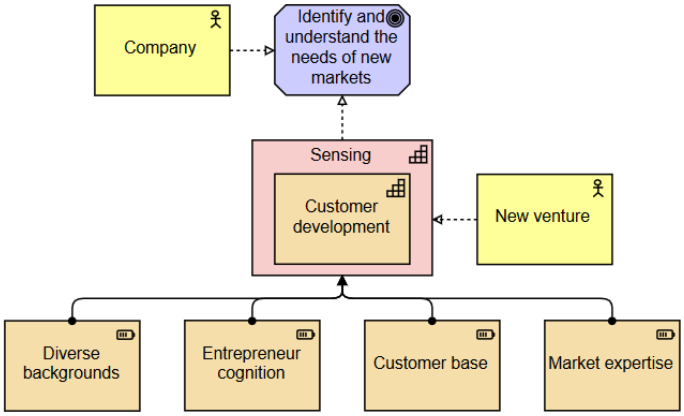


Figure 14. Model of “Identify and understand the needs of new markets” objective

Generate new business ideas (3). Startups developing products with new technologies in new markets can be a source of business ideas to companies. In this case, companies are accessing the *sensing dynamic capability* but with focus on both customer development and research and development, as modelled on Fig 15.

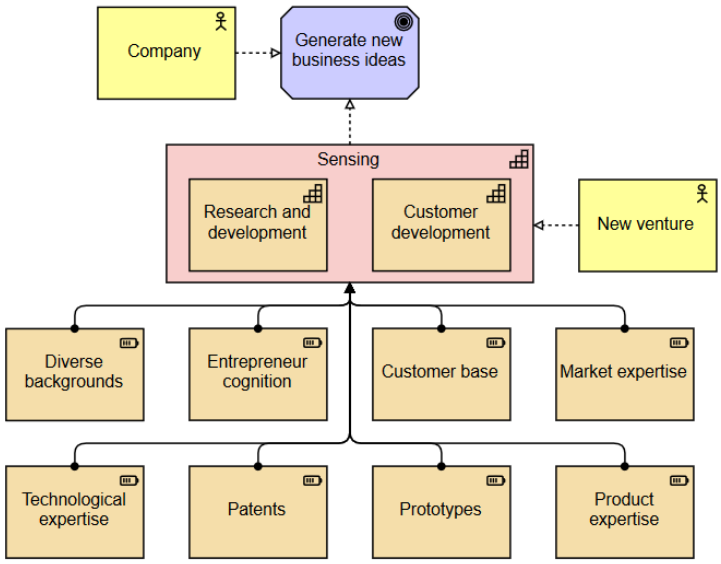


Figure 15. Model of “Generate new business ideas” objective

Test new business models (4). Finally, companies can use partnerships to test new business models without the organizational rigidities of big firms. Startups are informal and flexible enough to test new business models with a much faster pace, what is needed in some markets. In this case, the company is accessing the *seizing dynamic capability*: business development. With associated resources as culture, organization structure, and sales expertise, as modelled on Fig 16.

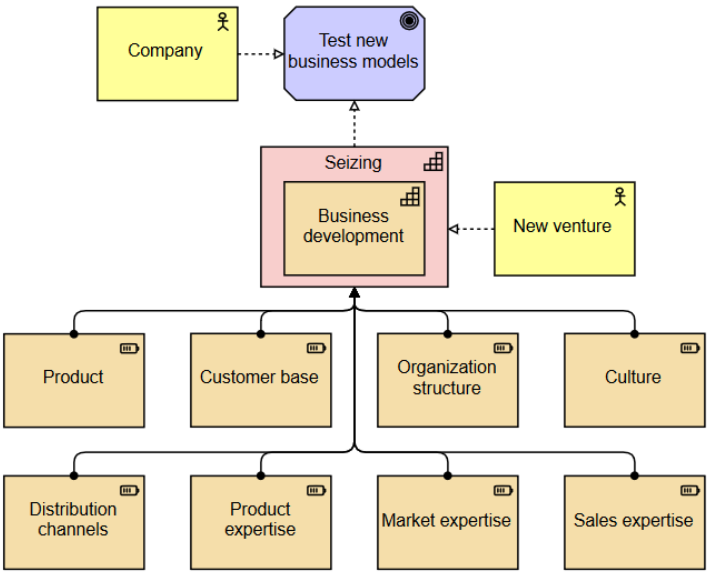


Figure 16. Model of “Test new business models” objective

Derived objectives

There is evidence that companies combine the previous objectives to achieve derived objectives. We identified four derived objectives.

Create demand for firm product (5). Companies often partner with startups to create demand for products. In this case, companies need to generate new business ideas and test new business models that use the company's products, as modelled on Fig 17.

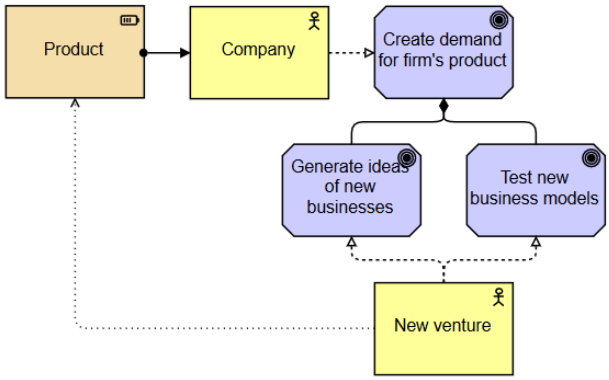


Figure 17. Model of "Create demand for firm's product" objective

Develop products on current platform (6). Some companies have platforms that need to be populated with applications, products, and services. Companies can partner with startups to build the ecosystem around these platforms, as modelled on Fig 18.

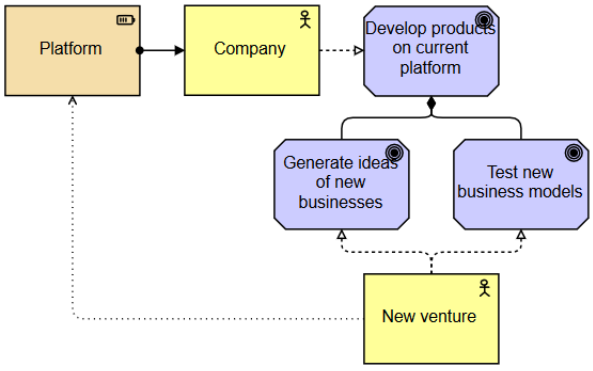


Figure 18. Model of "Develop products on current platform" objective

Exploit firm's technologies in non-core businesses (7). Companies with extensive technology expertise can miss opportunities to apply these technologies in non-core businesses. To leverage these assets, they can partner with startups and profit from royalties, equity or % of revenue, as modelled on Fig 19.

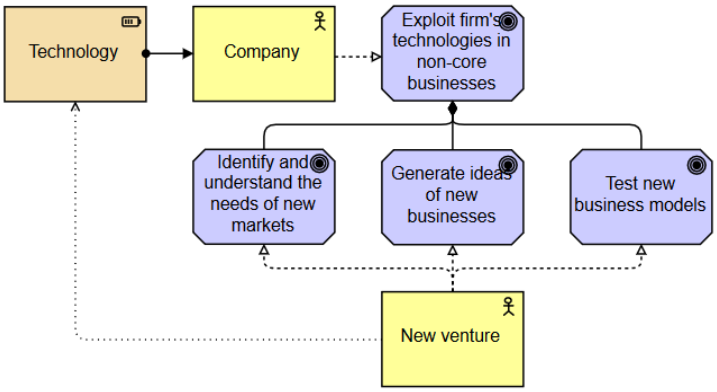


Figure 19. Model of "Exploit firm's technologies in non-core businesses" objective

Solve existing business problem (8). Startups can integrate a company value chain by solving an existing business problem. In this case, the new venture brings in new capabilities to solve the problem and a business model around the solution, as modelled on Fig 20.

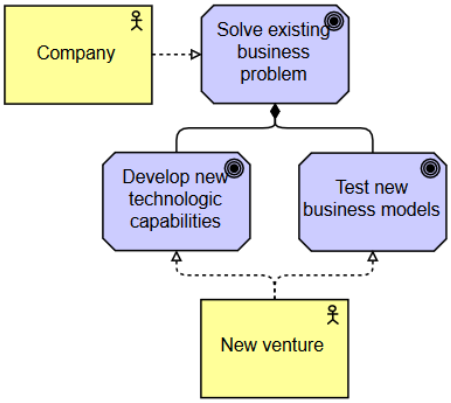


Figure 20. Model of "Solve existing business problem" objective

Additional objectives

Besides the strategic and financial objectives, collaborations between corporation and startups usually lead to additional intangible benefits. We identify three relevant additional objectives.

Foster innovation culture. Culture of startups and new ventures can penetrate the company's structure, as modelled on Fig 21.

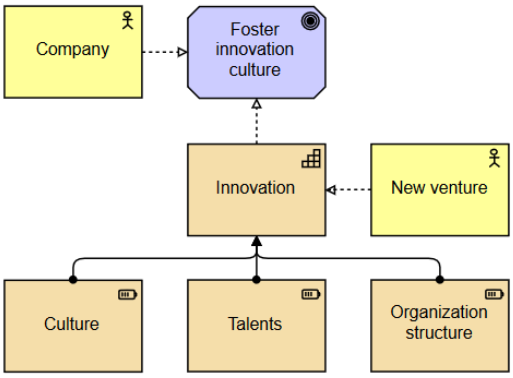


Figure 21. Model of "Foster innovation culture" objective

Attract talent. Partnerships can attract talents in two ways. With an innovative image, companies can more easily attract talent to their recruitment processes. Besides that, the proximity with the partner's human resources and lead to recruitment from these ventures, as modelled on Fig 22.

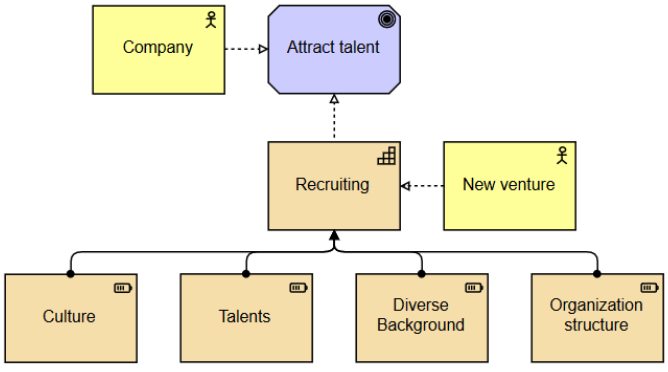


Figure 22. Model of "Attract talent" objective

Improve innovative brand. Associate the brand with startups can rejuvenate the company's brand, sending a message of innovative and young brand, as modelled on Fig 23.

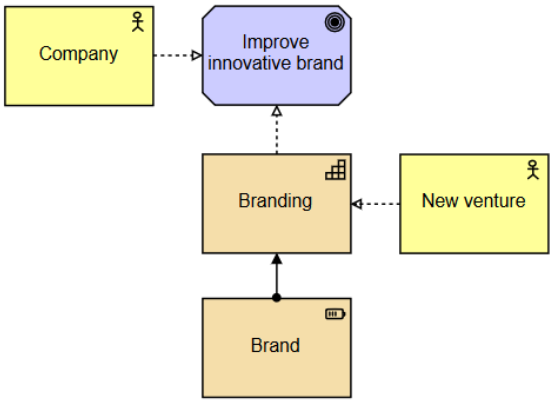


Figure 23. Model of “Improve innovative brand” objective

These three additional objectives conclude the objectives dimension of the typology.

5.3.3 Design elements

Several design elements are identified in the literature. Most design elements are direct linked with objectives. We define design elements into two categories. Approach, comprises strategic elements of the program configuration. Organization, comprises the elements of operation and process.

Approach

Locus of opportunity. Companies can source innovation inside or outside their organizations. Sourcing innovation inside the company is a way to motivate entrepreneurial employees, creating protected environments without organizational rigidities that unable innovation. However, sourcing internally do not bring new competencies to the company. Most programs source innovation externally because outsiders bring in new experiences, competences, motivations and are not tied with internal projects and politics.

Strategic logic. Following the March strategic logic, programs can focus on exploring new problems or solutions, or exploit current company competencies to foster new ventures development. Companies aiming to earn financial gains through leveraging current assets are immersed in the exploitation logic. Companies pursuing new technologies, new market through innovation are following the exploration logic. These two logics when pursued simultaneously generate several organizational

conflicts. Therefore, companies with strict exploitation logic can use partnerships to enable exploration in an independent organizational structure.

Industry relation. Related to the familiarity matrix and strategic logic, companies can pursue partnerships with new ventures related or non-related to their core-business industry. Companies aiming strictly for financial gains usually partner with non-related ventures, avoiding conflicting interests. Partnerships focusing on improving the company's value chain usually require tight industry relation between the startup and the company.

Revenue model. Support programs can have different revenue models, such as sponsorship, fees, % of earnings and equity. Programs with strategic objectives usually have revenues to keep the program sustainable, not to generate financial gains. For independent and pure financial institutions, the revenue model is important to achieve the financial objective.

The revenue model is tightly related to the control level. Partnerships involving equity bring more control to the company, while fees and % of earnings guarantee more freedom to the startup or new venture.

Degree of Elaboration / Venture Stage. Support programs are aimed to specific solution degree of elaboration (innovation contests). The desired degree of elaboration is one of the main characteristics of a program. Contests requiring full solutions have the benefit of generating a solution that stage is nearly in product form, however, this kind of contest require more incentives and expect fewer participants, reducing the variety and increasing costs.

Analogously is the aimed partner venture stage. The cost to partner with startups increase fast with the venture stage. In idea or startup phase, a company can build an accelerator and partner every cycle with dozens of startups. On the other side, with late-growth firms, a single partnership through venture capital can cost several million dollars. So, for both degree of elaboration and venture stage, there is a trade-off of cost, variety and development stage.

Organization

Duration. Support programs can last from hours on hackathons to years in corporate venture capital.

External Partner. Companies can rely on outsourcing to execute support programs.

Connection to parent. The entity executing the support program can be integrated or completely separated from the parent company.

Leadership experience. Responsibility of the management of the support program can be dedicated to someone internal of the parent company or an external hire with experience in startups ecosystem.

Involvement Degree. There are several features companies can supply to new ventures to support their development. More details in resources section.

5.3.4 Resources and Capabilities

Partnering with startups is a way of accessing their resources. Some of these resources are useful for companies reach their strategic goals. In the following view, we present the main resources and capabilities accessed by companies in collaboration programs. The views are presented per venture stage. New ventures in the same stage have similar resources, the program model changes the way the resources are accessed but do not change the resource pool itself.

Besides that, we present resources and capabilities offered by companies to startups in each collaboration program model. This view is relevant to enumerate the resources that companies should be willing to provide to engage in partnerships. With the boom of startups, there is a strong competition between companies and institutions to partner with the best ventures. Entrepreneurs seek partnerships that provide the maximum pool of resources in exchange of the less possible equity, fees or % of earnings.

New ventures' view

As firms mature, their resource pool evolves as well. In each business phase, startups have different resource pools. The following models represent the resource and capability pool of each startup phase (Blank, 2015).

Idea phase. In this phase, there is no stablished company, the entrepreneurs are in a conceptual phase of identifying a problem and proposing a solution. Therefore,

all resources are classified as knowledge. These resources are related to the sensing dynamic capability, as modelled on Fig 24 and 25.

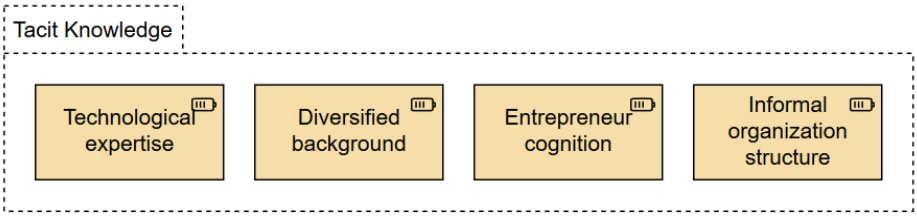


Figure 24. Idea phase resource map

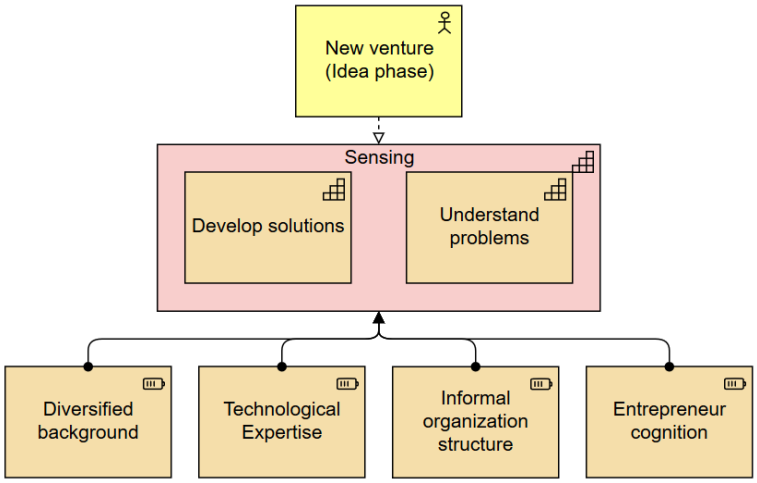


Figure 25. Idea phase capability realization view

Startup phase. In this phase, the startup is stablished and is developing its product to meet the market needs. Besides the sensing capabilities, there is the presence of seizing capabilities. The startup begins to test its business model and iterates its products responding to customer demands. Supported by an informal organization that enables fast decision making and changing, startups in this stage are in the exploration logic, as modelled on Fig 26 and 27.

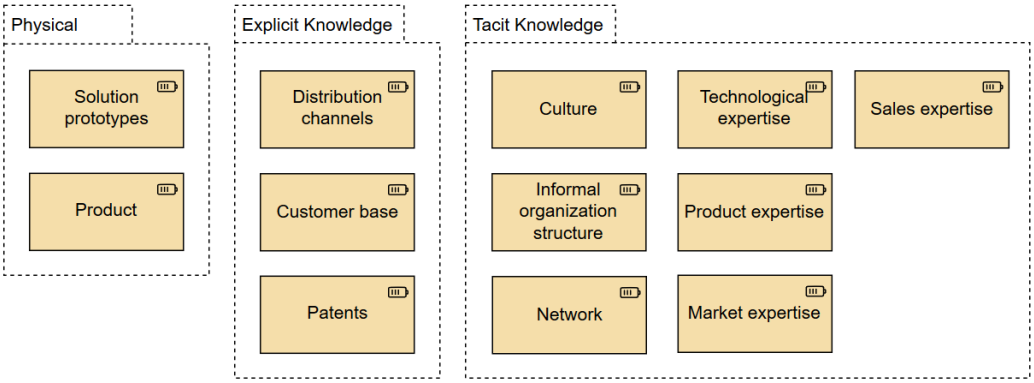


Figure 26. Startup phase resource map

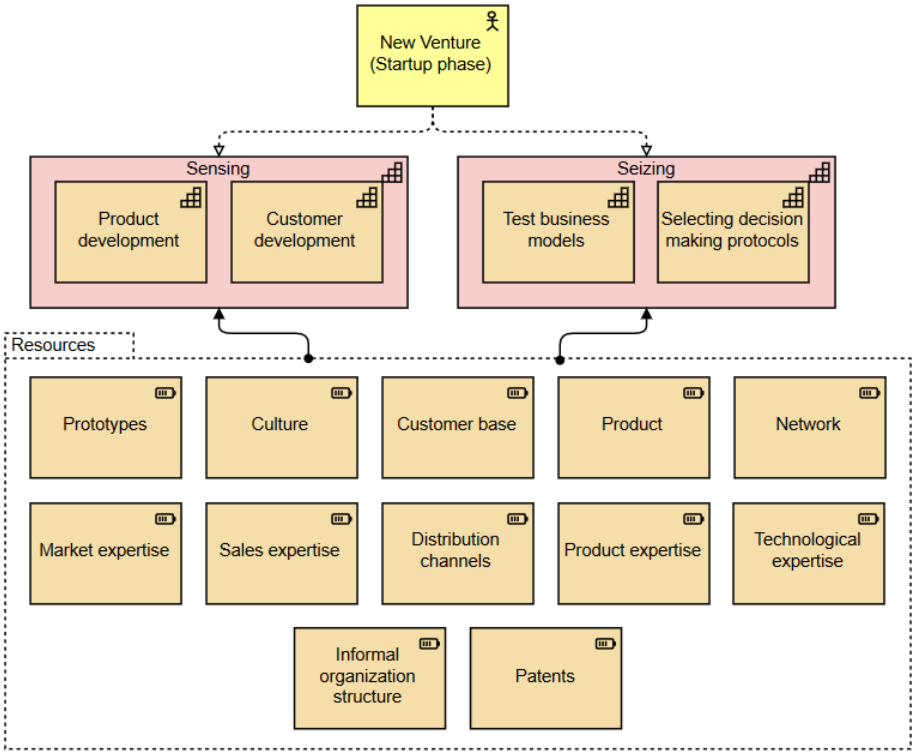


Figure 27. Startup phase capability realization view

Growth phase. In the growth phase, the startup starts to build its processes to scale. Besides the sensing and seizing dynamic capabilities in the exploration logic. The firm begins to develop capabilities in operations management, sales, marketing, information systems. At this point, the startup have relevant physical and explicit knowledge resources that can be accessed by a partner company, such as customer base, validated business model, product, patents. Partnerships with growth startups is expensive as its valuation is high, as modelled on Fig 28 and 29.

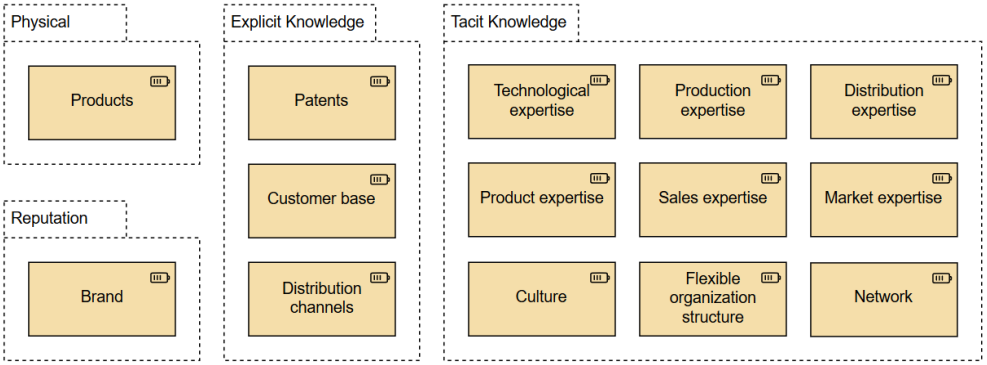


Figure 28. Growth phase resource map

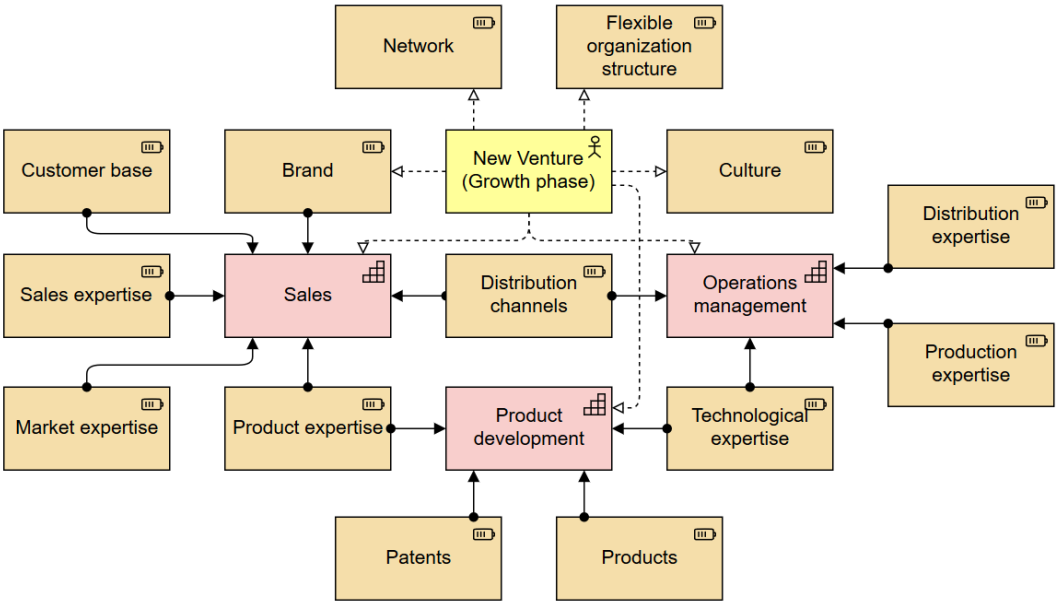


Figure 29. Growth phase capability realization viewpoint

Company's view

To implement a collaboration program with startups. Companies should be willing to share or give resources to startups. The following views enumerate the common resources shared in each collaboration program, modelled on Fig 30 to 37.

Innovation contest

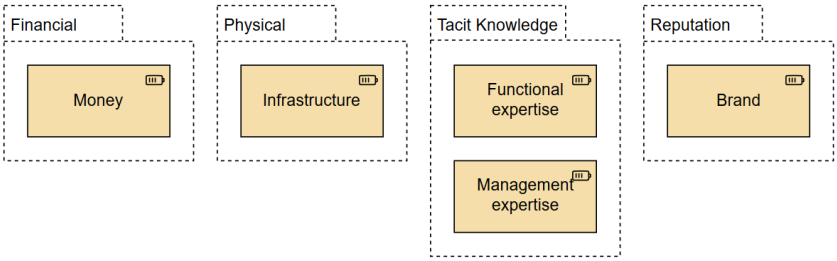


Figure 30. Innovation contest resource map

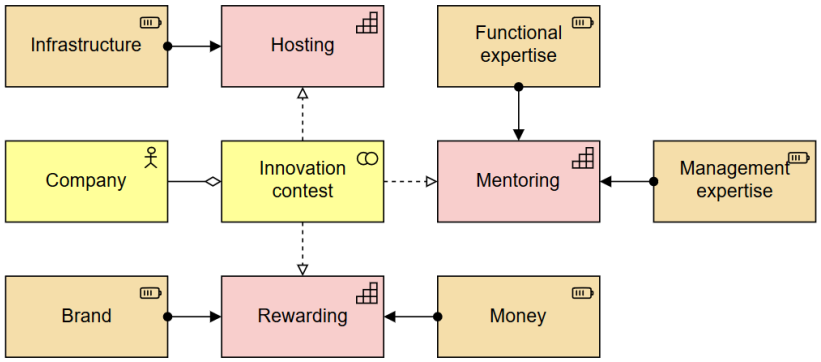


Figure 31. Innovation contest capability realization view

Corporate accelerator/incubator

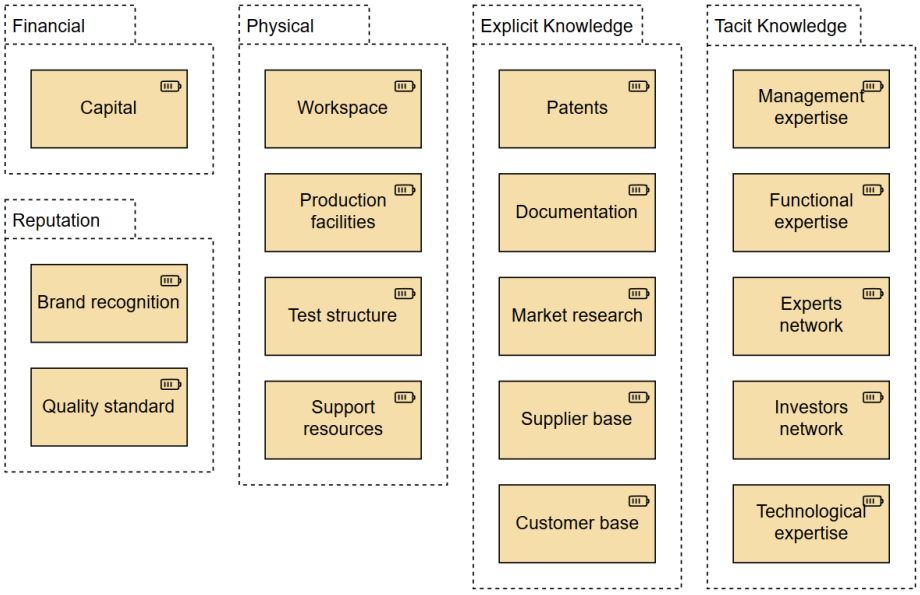


Figure 32. Corporate accelerator/incubator resource map

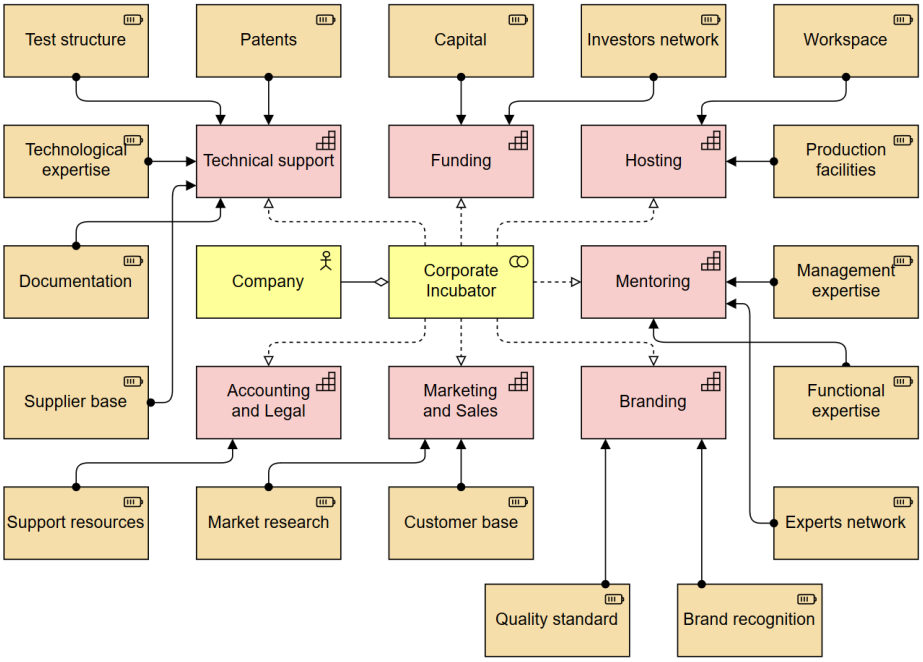


Figure 33. Corporate accelerator/incubator capability realization view

Venture builder

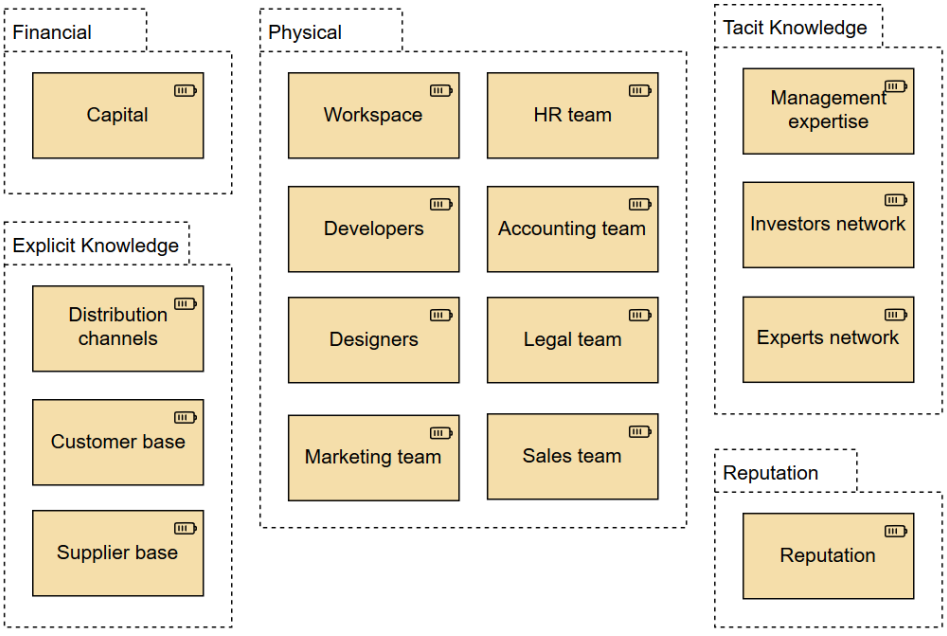


Figure 34. Venture builder resource map

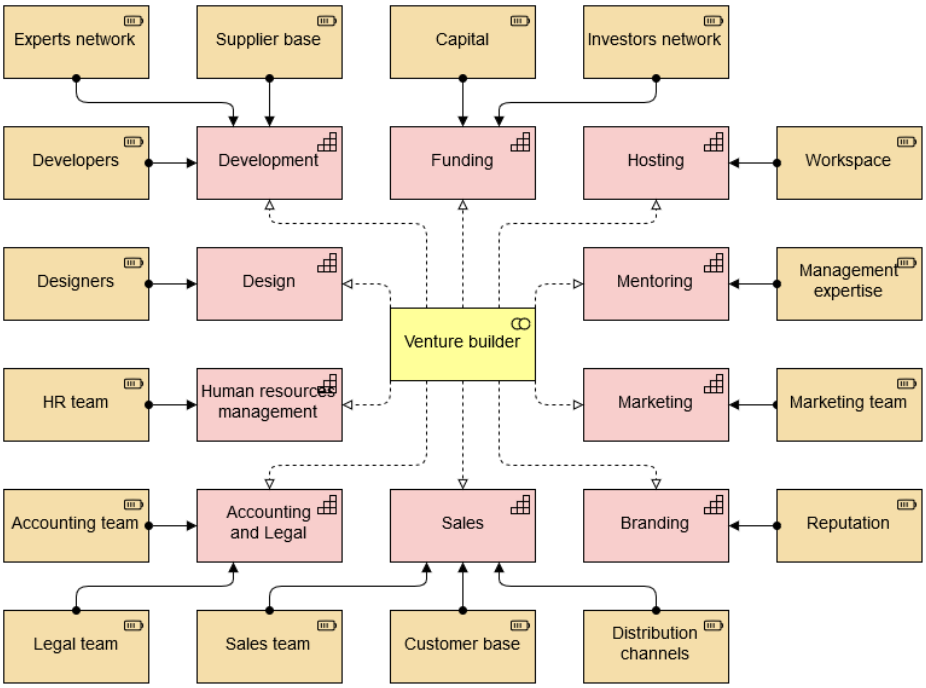


Figure 35. Venture builder capability realization view

Corporate venture capital

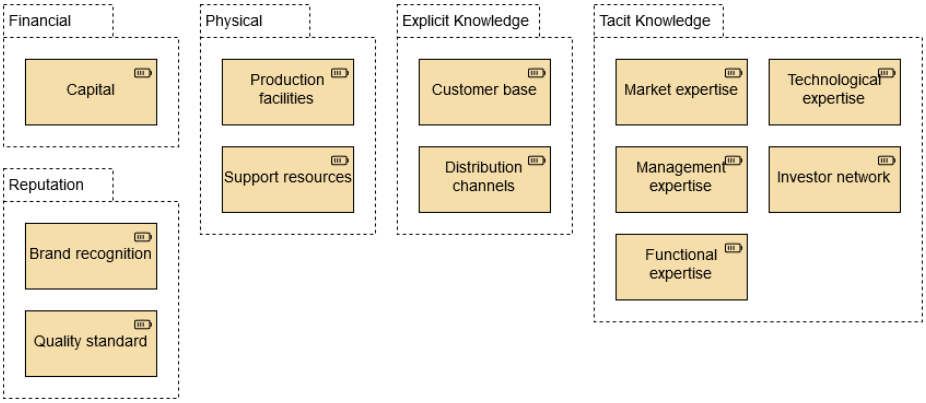


Figure 36. Corporate venture capital resource map

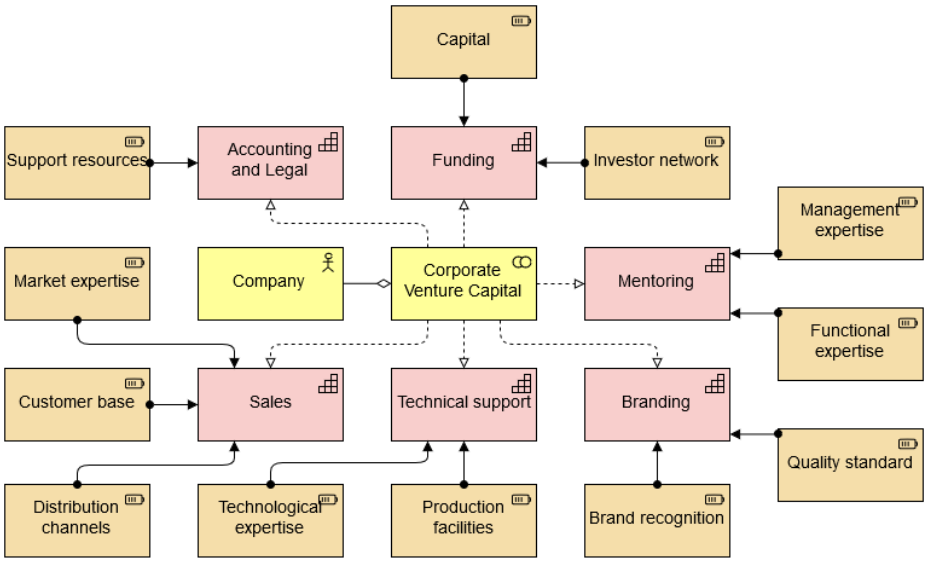


Figure 37. Corporate venture capital capability realization view

5.3.5 Program typology

Our typology comprehends 22 types of collaboration programs. Firstly, we present the major characteristics of each model and then present the typology with the known types of program models.

The table is not exhaustive. Our objective is to define the most notable collaboration program models under our objectives dimension. The design elements dimension varies greatly from program to program. It is usual to companies tailor their program to specific needs, so this table tries to generalize the existent programs to better understanding, not define every program.

After each program characterization, there is a line with an example of a notable program following that logic.

The typology is used in the selection method to support decision making. The complete program typology is presented in the appendix A.

Innovation Contest

We have evidence of four types of innovation contests (MacCormack, Murray and Wagner, 2013; Briscoe and Mulligan, 2014). Summarized in table 7.

Hackathon

Hackathons are short-term competitions (hours to maximum of three days) where small teams develop digital solutions to defined problems, explore a technology potential without a specific problem or a mixture of both.

Objective. These competitions have a strategic objective of exploring new markets/problems for existing technologies (New Market quadrant in the familiarity matrix) or develop solutions for known markets/problems (New Solution quadrant). Leveraging the sensing dynamic capability, mainly the research and development competence.

Hackathons are also used as an image improver tool. Focusing on college students and specialists, companies use these competitions as a showcase to prospect talent. Many competitions reward the best participants with interviews, internships or internal training.

Approach. With short duration, these competitions have the lowest costs compared to other collaboration programs. Consequently, the degree of elaboration is the least mature: idea or prototype. To result in a solution implementation or product launch, the result of hackathons must be further developed, internally by the company or in partnership with the idea creators.

Organization. Hackathons can be organized by a third-party or internally, depending on the company's strategy. As the support resources are very limited: little mentorship and strategic guidance, there is no need to a tight relation between the institution that develops the competition and the parent company. There are several institutions specialized in organizing this kind of contest such as Brightidea and Idea Connection.

Market Explorer

This type of program focuses on identifying and exploring new markets to existing technologies and competences.

Objective. These competitions have a strategic objective of exploring new markets/problems for existing technologies (New Market quadrant in the familiarity

matrix). Leveraging the sensing dynamic capability of participants and the company's capabilities. Companies with large pools of knowledge often underuse its assets, constrained by a corporate strategy. An alternative to leverage these assets is identifying and exploring new markets for its solutions and spin-off new firms.

This kind of competitions is also used to improve company culture, fostering internal innovation and empowering entrepreneurial employees.

Approach. With medium duration, these competitions usually target internal employees to identify and explore new markets for company's competences, who are used to these technologies. However, there is evidence of programs that also accept external participants to combine with internal workforce. The results of this competitions are ideas or prototypes of products using company's technology in other markets. Again, this result must be further developed to reach a product launch.

Organization. As many company's try to leverage confidential expertise with internal employees, market explorer programs are often organized internally. The company provides intense mentorship and support on the potential technology, however, it lacks the expertise on the target new market.

Solution Seeker

This type of program aims to develop new solutions for existing markets and business problems, levering external competences.

Objective. These competitions have a strategic objective of exploring new technologies/solutions for known markets/problems (New Solution quadrant in the familiarity matrix). Focusing on external technology capabilities and internal market expertise, this program provides a detailed description of the problem and open it to a group of solvers. With different backgrounds, organization settings and motivations, diverse solutions are submitted, ranging from a variety of technologies. This competition is an alternative to standard R&D, that is costly and biased towards company's current capabilities.

Approach. With medium duration, these competitions usually target external specialists with deep knowledge on technologies that the company does not have. With a specific problem description and proportional motivation, several competitions aim to gather full solutions or at least functional prototypes.

Organization. With little confidential information, necessary and the need of an extensive specialists' network, many companies rely on external platforms to organize solution seeker competitions. The company provides few resources, mainly a comprehensive description of the problem.

Idea Generator

This type of program aims to generate business ideas to support or complement the current company's strategy.

Objective. These competitions have a strategic objective of exploring new businesses (New Business quadrant in the familiarity matrix). In dynamic markets with changing technologies and customer behavior, companies can leverage their resources in new businesses. This type of competition generates ideas from internally and externally using the sensing dynamic capability, both R&D and customer development.

Approach. This format of competition provides more freedom to solvers, with open descriptions. Usually listing specific markets or technologies, companies look for high potential business ideas somehow related to their current business, complementing or supporting the current strategy. The results are ideas, that must be further developed internally or externally in partnership with the idea creators.

Organization. Again, the company provides few support resources in this kind of competition, the main motivation is on the prize. This way, third-parties can be accessed to organize the competition.

Table 7. Innovation contest typology

	Program	Innovation Contests			
	Type	**Hackathon**	**Market Explorer**	**Solution Seeker**	**Idea Generator**
Objective	**Primary**	Strategic	Strategic	Strategic	Strategic
	Familiarity Matrix	All	New Market	New Solution	New Business
	Description	Explore digital solutions to existing business problems or a specific technology potential	Identify and explore new markets for existing technologies and capabilities	Prospect solutions for identified business problems	Generate business ideas that complement or support current business strategy.
	Degree of Elaboration / Venture stage after program	Idea or prototype	Idea or prototype	Prototype or full solution	Idea or prototype
Approach	**Locus of opportunity**	External and internal	Internal	External	External and internal
	Strategic logic	Exploration	Exploration	Exploration	Exploration
	Industry relation	Minimum relation	Minimum relation	Strong relation	No minimum relation
	Revenue model	No revenue	No revenue	No revenue	No revenue
	Degree of Elaboration / Venture stage before program	-	-	-	-
Organization	**Duration**	12 hours ~ 3 days	1 ~ 12 months	1 ~ 12 months	1~12 months
	External partner	Partly	No	No	Partly
	Connection to parent	Part of parent	Part of parent	Part of parent	Part of parent
	Leadership experience	Internal	Internal	Internal	Internal
	Involvement degree	Support to understand the problem, strategic guidance	High mentorship on existing technologies and capabilities	Support and tools to understand the problem	Business support, strategic guidance
	Example	Startup Weekend	IBM Innovation Jam	Netflix Prize	Cisco I-Prize

Corporate Accelerator

Based on the research of (Kanbach and Stubner, 2016) there are evidence of four types of corporate accelerators. Summarized in table 8.

Listening Post

The listening post is an accelerator with only strategic objectives, without financial objectives.

Objective. This accelerator type has the objective of monitoring the environment for new trends in technologies and business models with potential to disrupt the parent company's industry. Therefore, it can partner with startups positioned in all quadrants of the familiarity matrix, that develop businesses that can impact the parent company's strategy.

Approach. It focuses exclusively on external startups and there is no equity involvement, so the company has less control and less impact over supported ventures. As the main objective is to monitor, it tends to maximize the number of startups in a cohort. To achieve this, it focuses on early-stage startups, even in idea phase, reducing initial investment and resources offering.

Organization. The organization of the listening post accelerator is similar to independent accelerators. Typically, 3-month program, cohort based, with intense mentorship, networking and a demo-day in the end.

Value Chain Investor

The main objective is to invest in startups with products that could be part of the parent company's value chain.

Objective. The value chain investor type searches for startups with strong relation with the parent company. The startup can be a potential client or supplier of the company. After the program, the successful startups can be integrated into the parent company's value chain.

Approach. This accelerator requires equity involvement, as it ensure access to technologies and strengthen cooperation. As the final objective is to integrate the startups into the company's value chain, the investments aim startups in growth stage, with a developed product.

Organization. With strong linkage with the parent company, startups invested by value chain investors can leverage functional resources beyond the traditional entrepreneurship mentorship and business networking. Startups can use specific technical expertise on technologies and markets of the parent company, as well as its distributions channels, customer base and production facilities. Internal leadership is essential to the success of value chain investors. The benefit of partnering with startups related to the core business is achieved when its resources and competences are successfully transferred internally, so internal leaders need to align with the accelerator objectives.

Test Laboratory

Test laboratory creates a protected environment to the high potential business ideas.

Objective. Following the organizational ambidexterity logic, mature companies tend to create organizational rigidities that unable innovation. The test laboratory aims to create an organizational separation to achieve organizational ambidexterity, enabling exploration inside an exploitation oriented organization. This accelerator focus on developing new businesses (New Business quadrant), somehow related to the parent company.

Approach. Diverging from the previous types, the test laboratory can accept internal or external startups with different business models with potential to convert into parent company's revenue stream. Equity involvement is required and assumes two approaches: to internal startups, the company selects internal projects to fund and in the end of the program decide to integrate the new business model to the core business or abandon the project. To external startups, it focuses on minority holdings in a higher number of investments. The combination of internal and external partners is important to create an entrepreneur environment with structural separation from the parent organization.

Organization. The test laboratory is a separate legal entity from the parent company to avoid conflicting interests. Besides that, the organization is similar to the independent accelerator type, with specific duration programs, cohort based, intense mentorship on business and networking. Depending on the linkage with the parent company, test laboratories can also leverage internal expertise on functional practices and market areas.

Unicorn Hunter

Unicorn hunters invest in promising startups, adding value and looking for financial gains.

Objective. With exclusive financial objectives, the unicorn hunter invests capital and resources in startup in exchange of equity (fixed terms or convertible loans).

Approach. This type follows the exploitation logic. It leverages the company's resources, such as technologies, network, customers, management expertise to add value to startups. There is no minimum relation with the parent company, the rational is to select startups that can benefit most from the company's resource pool.

Organization. With no strategic linkage to the parent company, unicorn hunters are separate legal entities. As it differs from the company's core business and represent a new business model to the corporation. It organization is like an independent accelerator, usually with experienced entrepreneurs as leaders.

Table 8. Corporate accelerator typology

	Program	Corporate Accelerator			
	Type	**Listening Post**	**Value Chain Investor**	**Test Laboratory**	**Unicorn Hunter**
Objective	**Primary**	Strategic	Strategic	Strategic	Financial
	Familiarity Matrix	All	New Solution	New Business	-
	Description	Understand recent trends and developments in a respective market and initiate relationships	Identify, develop, and integrate new products and services into parent company´s value chain	Create a protected environment to test promising internal and external business ideas	Invest in promising startups, make them more valuable, and earn a financial premium
	Degree of Elaboration / Venture stage after program	Startup phase	Startup phase	Startup phase	Startup phase
Approach	**Locus of opportunity**	External	External	Internal and external	External
	Strategic logic	Exploration	Exploration	Exploration	Exploitation
	Industry relation	Medium relation	Strong relation	Minimum relation	No minimum relation
	Revenue model	No revenue	Equity (5-12%)	Equity (5-12%)	Equity (5-12%), possible fee
	Degree of Elaboration / Venture stage before program	Startup phase	Startup phase	Idea or startup phase	Startup phase
Organization	**Duration**	2 ~ 12 Months	2 ~ 12 Months	2 ~ 12 Months	2 ~ 12 Months
	External partner	No	Partly	No	Partly
	Connection to parent	Part of parent	Part of parent	Separate legal entity	Separate legal entity
	Leadership experience	Internal and external	Internal and external	Internal	External
	Involvement degree	Intense mentorship on business and industry expertise, network development, strategic guidance	Intense mentorship on business and industry expertise, network development, strategic guidance	Intense mentorship on business expertise, minimum strategic guidance	Intense mentorship on entrepreneurship methods and business expertise, network development, strategic guidance
	Example	Microsoft Ventures Accelerator	TechStarts METRO Accelerator	Allianz Digital Accelerator	Axel Springer Plug & Play

Corporate Incubators

According to (Becker and Gassmann, 2006a) there are three types of incubators based on objectives. Summarized in table 9.

Fast-Profit

The fast profit incubators leverage internal technologies in non-core markets.

Objective. Based on the logic of underutilization of technologic assets of R&D intensive firms, fast-profit incubators look for technologies with high-potential in non-core markets to achieve financial gain spin-offing new companies. Sensing dynamic capability: customer development and seizing: testing new business models.

Approach. This type follows both exploitation and exploration logic. It exploits existing technological assets and explore new markets. The locus of opportunity is internal and highly tied with the R&D department. Its revenue model is based on minority stakes of equity.

Organization. As the main objective is to leverage technological assets, this incubator is linked with the R&D department of the company. Besides that, there is an agreement of which resources will be transferred from the parent company to the new venture.

Future Builder

Evaluate potential of new business ideas to integrate in the core business.

Objective. With a similar logic to the Test Laboratory accelerator. This incubator type aims to create a protected environment to test new business ideas too disruptive to integrate the current core business, but with potential to be integrated into the corporation. Seizing dynamic capability.

Approach. The future builder accepts internal or external startups with different business models with potential to convert into parent company's revenue stream. Equity involvement is required and assumes two approaches: to internal startups, the company selects internal projects to fund and in the end of the program decide to integrate the new business model to the core business or abandon the project. To external startups, it focuses on minority holdings in a higher number of investments. The combination of internal and external partners is important to create an entrepreneur environment with structural separation from the parent organization.

Organization. Future builder incubators are separate entities to guarantee the protected environment. The leadership can be external with links to internal senior positions to align the partner developments with parent company's strategy. This incubator also leverage strong networking capabilities of business management and technological know-how.

Value Chain Improver

This type focus on external sources of innovation to improve the company's value chain.

Objective. The value chain investor type searches for startups with strong relation with the parent company. The startup can be a potential client or supplier of the company. After the program, the successful startups can be integrated into the parent company's value chain.

Approach. This incubator requires equity involvement, as it ensure access to technologies and strengthen cooperation. As the final objective is to integrate the startups into the company's value chain, the investments aim startups in growth stage, with a developed product.

Organization. With strong linkage with the parent company, startups invested by value chain improvers can leverage functional resources beyond the traditional resources. Startups can use specific technical expertise on technologies and markets of the parent company, as well as its distributions channels, customer base and production facilities. Internal leadership is essential to the success of value chain investors. The benefit of partnering with startups related to the core business is achieved when its resources and competences are successfully transferred internally, so internal leaders need to align with the incubator's objectives.

Table 9. Corporate incubator typology

	Program	Corporate Incubator		
	Type	**Fast-Profit**	**Future Builder**	**Value Chain Improver**
Objective	**Primary**	Financial	Strategic	Strategic
	Familiarity Matrix	New Market	New Business	New Solution
	Description	Spin-off non core technologies for profit	Evaluate the potential of related new markets, technologies and businesses	Incubate new businesses for potential incorporation
	Degree of Elaboration / Venture stage after program	Startup phase	Startup phase	Startup phase
Approach	**Locus of opportunity**	Internal	Internal and external	External
	Strategic logic	Exploitation and Exploration	Exploration	Exploration
	Industry relation	No minimum relation	Minimum relation	Strong relation
	Revenue model	Equity	Equity	Equity
	Degree of Elaboration / Venture stage before program	Idea or startup phase	Startup phase	Startup phase
Organization	**Duration**	1 ~ 5 years	1 ~ 5 years	1 ~ 5 years
	External partner	No	No	No
	Connection to parent	Part of parent	Separate legal entity	Part of parent
	Leadership experience	Internal and external	Internal and external	Internal and external
	Involvement degree	Strategic and ad-hoc mentorship, network development, shared infrastructure and resources between incubated ventures	Minimum strategic influence, business expertise mentorship, network development, infrastructure and resources	Maximum strategic involvement, business expertise mentorship, network development, infrastructure and resources
	Example	Siemens Novel Businesses	Next47 (Siemens)	Siemens Technology to Business

Venture Builder

The venture builder is an emerging model with few references. We identify one type of corporate venture builder (Szigeti, 2016b). Summarized in table 10.

Corporate Builder

The corporate builder provides full support to new businesses in exchange of a majority stake of equity.

Objective. Create new businesses in a repeatable and simultaneous logic. In this approach, the company build new startups related to the company's core business following the venture builder approach. With a major stake in the new venture's equity,

the parent company can exit the investment integrating the new company to the core business or selling its stake to venture capitals or to other firms.

Approach. The venture builder approach develops new businesses in a repeatable and simultaneous process, with a pool of resources to be shared among the startups, such as developers, lawyers, accountants, engineers. Besides that, it leverages its corporative assets, such as brand, IT systems, customer base and technological expertise. In this model, the company is the shareholder controller of the new firm, providing all resources needed and assuming the risk. Entrepreneurs and other employees act as minority shareholders. The locus of opportunity is a mixture of internal and external sources.

Organization. Corporate builders demand intense investment to provide human, physical and capital resources to the new ventures. It operates as a separate entity from the parent company, guaranteeing independence in decision making and protecting the parent company from image problems of failed startups. It also requires very specific management capabilities, so it is often managed by experts in entrepreneurship from the outside environment.

Table 10. Venture builder typology

	Program	Venture Builder
	Type	**Corporate Builder**
Objective	**Primary**	Strategic
	Familiarity Matrix	All
	Description	Build industry related ventures in a repeatable processes. Leveraging corporate resources and accumulating expertise
	Degree of Elaboration / Venture stage after program	Growth phase
Approach	**Locus of opportunity**	Internal and external
	Strategic logic	Exploration and Exploitation
	Industry relation	Strong relation
	Revenue model	Equity (50%+)
	Degree of Elaboration / Venture stage before program	Idea phase
Organization	**Duration**	Long-term
	External partner	No
	Connection to parent	Separate legal entity
	Leadership experience	Internal and external
	Involvement degree	Full control and support
	Example	Kamet (AXA)

Corporate Venture Capital

The literature presents four types of corporate venture capital (Chesbrough, 2002).

All types of corporate venture capitals have similar structures of approach and organization. The main differences are notices on the objectives dimensions. Summarized in table 11.

Driving

Driving investments are closely related to the parent company's strategy and operation. It invests in startups that could integrate the company's value chain, acting as suppliers or customers of the parent company and possibly resulting in an

acquisition. Main objectives: solve existing business problem, create demand for existing products.

Enabling

In this case, corporate venture capitals invest in startups that develop the ecosystem around the parent company's core strategy, adding complementary products. The benefits translate in a higher demand for parent company's products. Main objective: develop products on current platform.

Emergent

Investment in startups with tight relation to operations but not related to current strategy. These investments are primarily financial, partnering with startups not compatible with the company's current strategy. However, with market shifts and consequently strategy updates, these investments can turn into competitive advantage in future markets. Main objective: exploit technologies in non-core businesses.

Passive

Acts as an independent venture capital to earn financial gains through investments. Main objective: earn financial gains.

Table 11. Corporate venture capital typology

	Program	Corporate Venture Capital			
	Type	**Driving**	**Enabling**	**Emergent**	**Passive**
Objective	**Primary**	Strategic	Strategic	Financial, may turn strategic	Financial
	Familiarity Matrix	New Solution or Business	New Solution	New Market or Business	-
	Description	Invest in related ventures to leverage industry specific assets, sustaining current strategy	Invest in complementary firms to develop an ecosystem	Leverage company technologies in non-core markets, making "real-options" investments	Invest in promising firms, make them more valuable, and earn a financial premium
	Degree of Elaboration / Venture stage after program	Growth phase	Growth phase	Growth phase	Growth phase
Approach	**Locus of opportunity**	External	External	External	External
	Strategic logic	Exploitation	Exploration	Exploration	-
	Industry relation	Strong relation	Medium relation	Minimum relation	No minimum relation
	Revenue model	Equity (10-20%)	Equity (10-20%)	Equity (10-20%)	Equity (10-20%)
	Degree of Elaboration / Venture stage before program	Startup or growth phase	Startup or growth phase	Startup or growth phase	Startup or growth phase
Organization	**Duration**	Long-term	Long-term	Long-term	Long-term
	External partner	No	No	No	No
	Connection to parent	Separate legal entity	Separate legal entity	Separate legal entity	Separate legal entity
	Leadership experience	Internal	Internal	Internal and external	Internal and external
	Involvement degree	Industry and technology expertise, board level advisory, network development	Industry expertise, board level advisory, network development	Technology expertise, board level advisory, network development	Board level advisory, network development
	Example	Microsoft Ventures	Intel Capital	Mitsui Global Investment	Google Ventures

5.4 SELECTION METHOD

The selection and design method uses the previous artefacts to select the most suitable collaboration program for the company and provides guidelines to design the program for the company's specific needs.

The method uses principles from TOGAF ADM and is divided in four phases.

The method is illustrated on the following model (Fig 38):

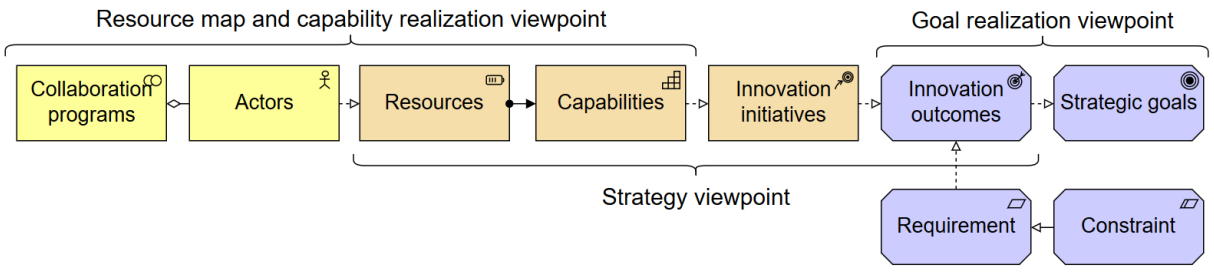


Figure 38. Selection method illustration

5.4.1 Motivation phase (requirements and constraints definition)

The target of this phase is to model the Goal Realization View of the collaboration initiative. For the identified goals, set innovation outcomes, requirements, and constraints that will be used in the Business Phase. Fig 39 presents the phase model. Each number represents a step in the selection method.

1. Identify the company's Strategic Goals achievable with programs. A series of objectives achievable with collaboration programs is listed on the Program Typology section. If the strategic goals are not directly related to the objectives detailed in the Program Typology section, decompose them, using those models. After this step, the strategic goals derive the Innovation Outcomes, tangible objectives presented in the Program Typology.
2. For each Innovation Outcome, define the Requirements. To match the following steps, at least the requirements related to the objectives dimension of the Program Typology should be gathered. These requirements are: strategic or financial objective, its position on the Familiarity Matrix and the degree of elaboration/venture stage.
3. After that, gather Constraints related to the Innovation Outcomes. To match the next steps, at least the constraints related to the Approach dimension should be defined: locus of opportunity, industry relation, revenue model.
4. Based on the previous inputs, model the Goal Realization View in Archimate 3.0. This view should present a comprehensive visualization of the motivation of the collaboration initiative as well as support the Strategy Phase.

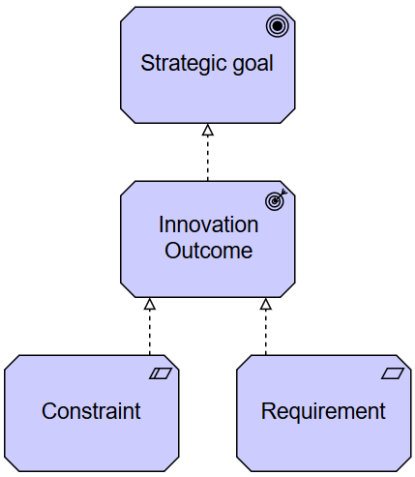


Figure 39. Goal realization view illustration

5.4.2 Strategy phase (resources and capabilities definition)

This phase should define which resources and capabilities the company has and misses to achieve its strategic goals. Modelling the Strategy View and the Resource Map, the strategy phase is based on the Value-Adding Model of collaboration programs to identify which resources and capabilities can be transferred from startups to companies. Fig 40 presents the phase model.

5. From the identified outcomes, define the necessary Course of Actions to reach the desired outcomes. Course of Actions are tangible actions to achieve the desired outcomes.
6. For each Course of Action, define the necessary Capabilities to perform the actions. The user should focus on Dynamic Capabilities, as companies and startups frequently have complementary Dynamic Capabilities. The models of the Program Typology can support this definition.
7. For the necessary Capabilities, identify the Resources needed to perform the Capabilities. In this step, the user should focus on VRIN resources. Other resources could be acquired easily by the company, however, VRIN resources transferred from new ventures generate competitive advantage.
8. With the necessary Capabilities and Resources, model the Strategy View, relating Capabilities and Resources to the Innovation Outcomes. This view presents, from the strategic viewpoint which Resources and Capabilities the company should look for achieve desired Strategic Goals.

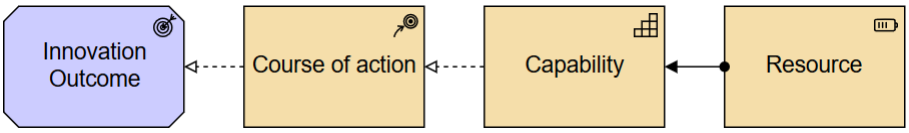


Figure 40. Strategy view illustration

9. Based on the identified necessary Capabilities and Resources, model baseline Resource Map for the firm's available resources to pursue the objectives, using the classification of the Value-Adding Model. Fig 41 presents the resource map.

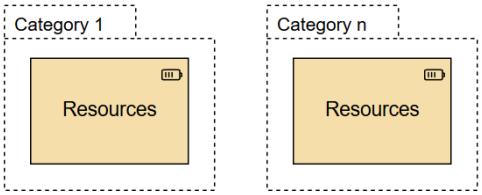


Figure 41. Resource map illustration

10. Compare the Strategy View and the Resource Map to list the missing Resources that should be found in partner ventures.

5.4.3 Business phase (selection phase)

The objective of this phase is to select the most suitable collaboration program based on the requirements, constraints, capabilities and resources identified on the previous steps. This phase can be modified depending on the requirements and constraints. If the company is more flexible on constraints, it should start selecting program models that respect and requirements and then eliminate programs based on the constraints. Eventually, changes in constraints are welcome to permit a program model that do not meet all constraints, but have great benefits and worth the changes in constraints. Fig 42 presents the phase model.

11. From the Program Typology and the Goal Realization View, identify Collaboration Programs that respect all requirements. Requirements are defined on the Objectives dimension.
12. Based on the Program Typology and the Goal Realization View, eliminate programs that do not respect constraints. In this step, the user should focus on the Approach dimension group, focusing on Locus of Opportunity, Strategic Approach, Industry Relation, Revenue Model and Venture Stage/Degree of Elaboration.
13. After the last step, there should be a shortlist of possible programs. From this list, the user should select the program that provides the missing resources of the 10th step. If many programs provide the missing resources, the user should select the most suitable one based on the local environment (availability of startups for each program), and on other criteria such as costs and duration.
    If no program respects all the requirements and constraints, the user should evaluate if it is possible to change any requirement or constraint to enable the realization of a program.

14. With the selected Program, model the Capability Realization View. Linking resources and capabilities with the respective Actors and the Collaboration Program that aggregates the Actors.

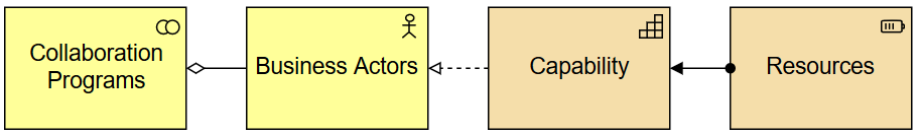


Figure 42. Capability realization view illustration

6 DEMONSTRATION

The artefacts developed on the previous section were tested on a real organization in the test phase of the DSRM.

LoriComm is a Portuguese telecommunications company that provides Internet of Things (IoT) communications infrastructure. As part of LoRa Alliance, an open non-profit association, LoriComm sells Low Powered Wide Area Networks (LPWAN) services based on LoRa protocol (LoRaWAN).

This technology enables communication of IoT devices with a central network server. As an alternative to wireless (Wi-Fi) or cellular systems, such as LTE, LoRaWAN provides a slow connection (0.3kbps up to 50kbps), at an extreme low cost and low battery consumption. This protocol proved ideal for IoT devices not connected physically to power supplies or internet networks.

As an infrastructure provider, LoriComm success depends on the demand of its services. The IoT ecosystem is in early development stage. This way, LoriComm aims to spread its technology among IoT startups to boost demand on its infrastructure and justify the investment in the infrastructure.

The numerations refers to the phases described in the section 5.4.

6.1 MOTIVATION PHASE

6.1.1 Goals identification

LoriComm management wants to partner with new ventures to realize one main goal.

1.1. Create demand for its product.

To achieve this goal, LoriComm defined the following outcome.

1.2. Foundation of new IoT firms.

6.1.2 Requirements definition

LoriComm aims to build demand for its infrastructure, therefore the main objective is strategic. The partners should develop entire new businesses that use LoriComm infrastructure, the position in the familiarity matrix is new business. To have

the necessary impact as LoriComm customers, the partners should be at least on the startup stage, when they start to use the LoriComm infrastructure.

2.1. Primary: strategic
2.2. Familiarity matrix: new business
2.3. Venture stage: startup or growth phase

6.1.3 Constraints definition

For the identified outcomes, LoriComm defines the following constraints.

As the shareholders of LoriComm are also shareholders of another IoT company, they want to avoid conflicting interests in equity involvements with other IoT firms. Besides that, with its operations starting in Portugal, LoriComm has limited budget to foster demand through partnerships. LoriComm operates only in Portugal, so the partners should have major operations in Portugal. As the main objective of the partnership is to foster demand of the IoT infrastructure, the partners should have the potential to use the LoRaWAN technology.

3.1. Locus of Opportunity: External
3.2. Industry Relation: LoRaWAN potential user
3.3. Revenue Model: no equity involvement
3.4. Costs: 100kEUR
3.5. Location: Portugal

6.1.4 Goal realization view

With the previous information, it is possible to model the goal realization view, what concludes the motivation phase. This model (Fig 43) characterizes the motivation of the collaboration program.

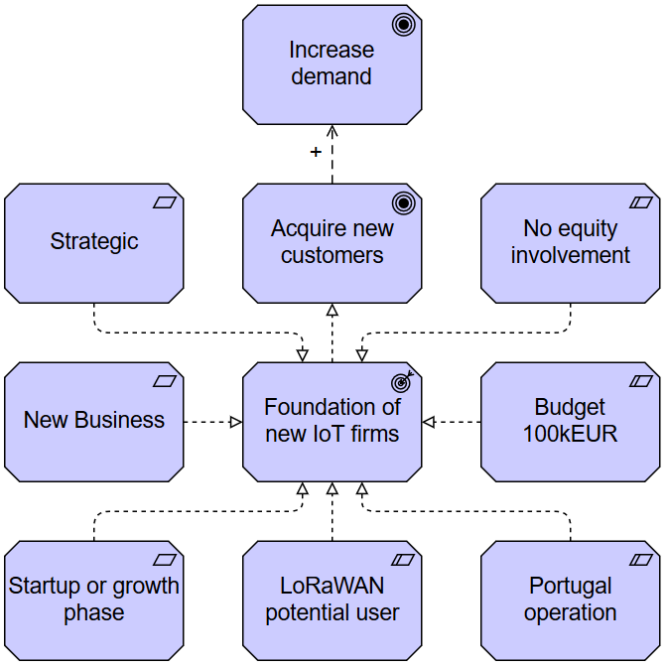


Figure 43. LoriComm goal realization view

6.2 STRATEGY PHASE

6.2.1 Necessary resources and capabilities

In this step, we identify the necessary course of actions to achieve the desired outcome. After that, we define the necessary capabilities and assigned resources to perform the course of actions.

The foundation of new IoT firms that use LoRaWAN technology and operates in Portugal is achieved with a combination of three courses of action.

5.1. Spread LoRaWAN technology.

5.2. Generate related business ideas

5.3. Test new business models

From the three courses of action above, two are achievable with partnerships: 5.2 and 5.3. So now we model the necessary resources and capabilities to perform these courses of action, focusing on dynamic capabilities and VRIN resources.

6.1. Sensing (dynamic capability)

6.1.1. Diverse background

6.1.2. Entrepreneur cognition

6.1.3. Technological expertise

6.1.4. Market expertise

6.2. Seizing (dynamic capability)

6.2.1. Product

6.2.2. Customer base

6.2.3. Organization structure

6.2.4. Culture

6.2.5. Distribution channels

6.2.6. Management expertise

6.2.7. Market expertise

6.2.8. Sales expertise

With these elements, we have the strategy view of the courses of action (Fig 44).

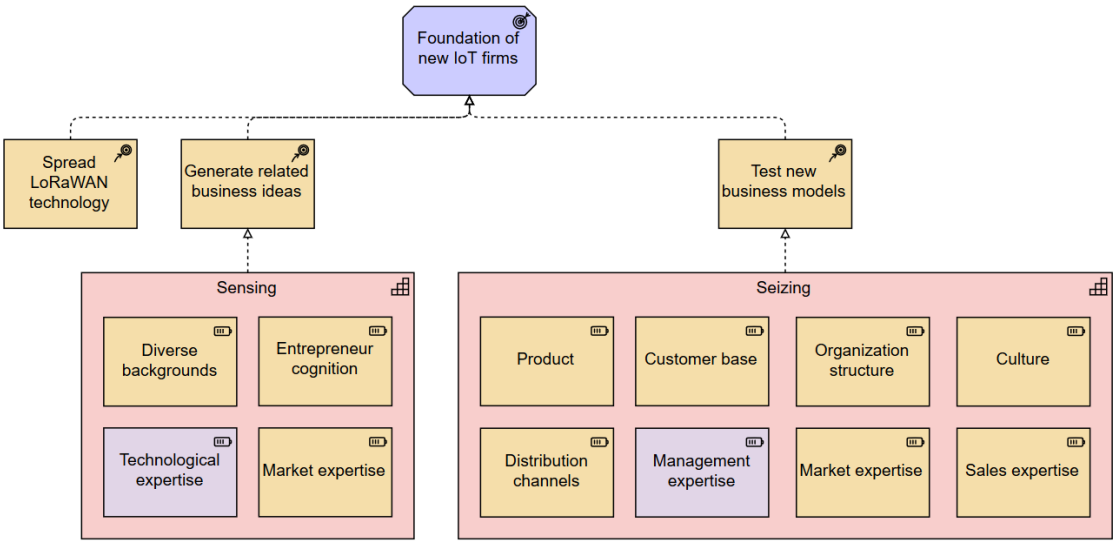


Figure 44. LoriComm strategy view

6.2.2 Available resources and capabilities

In the 9th step, we identify the company's available resources to pursue the objectives. To support new businesses using LoRaWAN, LoriComm provides the following resources.

9.1. Technical expertise – LoriComm can provide expertise and technological advice through its engineering team, helping firms develop technology awareness and expertise.

9.2. Management expertise – LoriComm is managed by several experienced managers in the IoT industry that are available to provide management expertise on the industry.

9.3. Networking – As part of LoRa Alliance and managed by a group of entrepreneurs and investors, LoriComm can connect its partners with investors, technology experts and management experts.

9.4. Endorsement – Being endorsed by a LoRa Alliance member improves firm's image as user of a world-class, cutting edge technology.

With these resources, we model the resource map (Fig 45) of available resources.

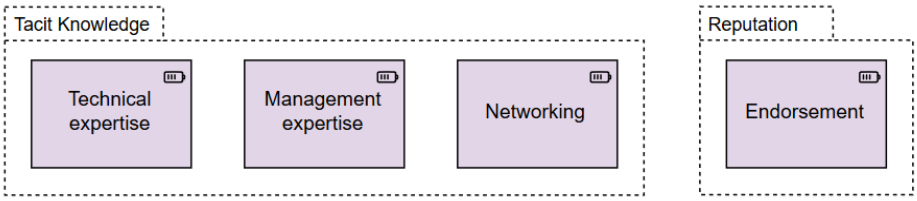


Figure 45. LoriComm resource map

After comparing the available resources with the necessary we list the missing resources.

- The missing resources are explicit in orange in Figure 44. LoriComm Strategy View.

6.3 BUSINESS PHASE

6.3.1 Program selection

11. From the typology, we identify program types that achieve the desired objectives.
    11.1. ***Corporate Venture Capital*** – Driving: completely achieve the objective, investing in firms aligned with current company's strategy, it directly increases demand on current product line. Require existing potential startups in growth phase.
    11.2. ***Corporate Incubator*** – Future Builder: completely achieve the objective, supporting companies that use LoriComm products. Require existing potential startups in startup or early-growth phase.

11.3. ***Corporate Accelerator*** – Test Laboratory: completely achieve the objective, supporting early-stage startups that use LoRaWAN. Require a high number of potential startups in early-stage.

12. Programs that achieve fully the approach constraints:

12.1. ***Innovation Contest*** – Hackathon: used to identify trends and potential of new technologies. Not suited for LoriComm objectives.

12.2. ***Innovation Contest*** – Idea Generator: useful to generate IoT business ideas and prospect entrepreneurs to further development of potential ideas. Achieves the “Generate related business ideas” of the LoriComm strategy, however, does not achieve the “Test new business models”.

12.2.1. ***Corporate Accelerator*** – Listening Post: useful to identify trends and developments in related markets and technologies. Not suited for LoriComm.

13. Constraints and requirements analysis

13.1. Programs that fully meet the objectives requirements do not respect the constraints.

13.2. The only program that meet all constraints and achieve partially the objectives is the ***Innovation Contest***.

Therefore, eliminating programs based on the constraints, the program that achieves partially the requirements and respect all constraints is the innovation contest.

Innovation contests are efficient in generating new business ideas, providing the sensing capability. However, to transform business ideas and prototypes into new businesses, it is necessary to access the seizing capability, when new business models are tested and the company is created. Therefore, with these requirements and constraints, LoriComm can achieve only partially the desired outcomes. Final model in Fig 46.

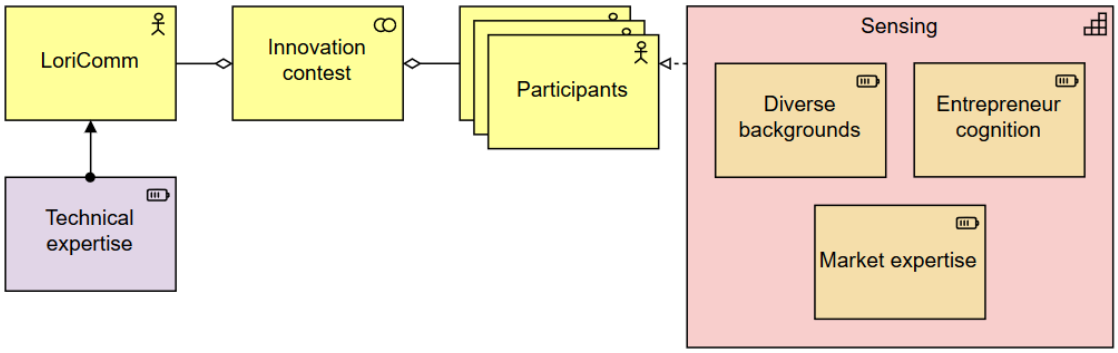


Figure 46. LoriComm capability realization view with collaboration program (TO-BE)

7 EVALUATION

This section corresponds to the evaluation step of the DSRM. We evaluate the developed artefacts using the results of the demonstrations. Based on a critical analysis of the demonstration, we evaluate the strengths and weaknesses of the solution for each step of the demonstration.

The demonstration follows the steps presented on the selection method. Though the selection method requires the inputs of both value-adding model and program typology, evaluating the method performance also explicit the quality of the previous artefacts.

Therefore, we divide the demonstration in three sections, corresponding to the selection method steps: motivation phase, strategy phase, and business phase. To evaluate each phase, we define the objectives of the phase and evaluate how the developed artefacts contributed to these objectives.

7.1 MOTIVATION PHASE

The motivation phase has the objective of identifying objectives achievable with collaboration programs and the correspondent requirements and constraints.

To gather this information, we interviewed a LoRiComm executive. As the executives have a clear image of the company strategy and objectives, we could easily define the strategic objectives of the company. However, the executive communicated the major strategic objectives, not necessarily related to collaboration programs with startups. Thus, it is possible that the executive did not know which objectives could be supported by collaboration programs. This problem represents a weakness of the method. To solve, we propose in next iterations present, during the interview, the models of section 8.2.2 Strategic Objectives. With those models, he could understand the potential of partnerships and relate with the company’s strategic objectives.

After the identification of objectives, we gathered requirements and constraints related to the objectives. Again, we walked freely in diverse requirements and constraints, many not directly related to the method. Although we gathered relevant requirements and constraints that proved useful in the next steps of the method, we plan to define a list of important requirements that are always useful to select programs on the typology, such as budget, maximum duration, and equity participation.

To model the objectives, requirements, and constraints we used the Archimate modelling notation. For this task, Archimate proved efficient, absorbing the relations and details, providing a comprehensive model of the discussed elements.

Based on this, there is a tradeoff of making the method structured. If we ask questions in an algorithmic form, we can constraint the executive participation and ignore relevant information. However, asking for objectives and constraints without direction can also mislead the discussion and ignore relevant facts of collaboration programs.

On this demonstration, this phase was successful, the goal realization view provided a concise and meaningful model of the company's motivation and was the base for the next steps.

7.2 STRATEGY PHASE

The objective of this phase is identifying the necessary resources to achieve the objectives of the previous phase and defining which resources the company already have.

For the "Foundation of IoT firms" objective, we identified the necessary outcomes to its realization. These outcomes were based on the executive's background and experience on the industry. For each outcome, we defined the correspondent dynamic capabilities based on the framework of dynamic capabilities.

The associated resources with each dynamic capability is derived from (Teece, 2009). After this, we looked for resources that the company already had, again asking for the executive in an interview. Based on the differences in the resource pool, we could determine what resources the company was looking for.

The method performed well until this part. But it missed an important aspect of collaboration programs. In this phase, we should identify the resources that the company already have and is willing to share as well as other resources necessary to develop a collaboration program that the company is willing to acquire and share. This step is essential to shortlist programs based on the resource offering. Many programs required a comprehensive resource pool offering, without this offering, it is impossible to develop these programs.

Based on this, we propose include another step, to identify the resources the company is willing to acquire and share based on the models of the section 8.4.3.2.

Company's view. With these models, the executive can understand the necessary resources to develop each program and take the decision of acquiring or not the necessary resources.

In the interview, we asked the resources offering to guarantee the method completeness. Again, we used Archimate as modelling tool. The novel Archimate 3.0 update guarantees the necessary semantic to model resources and capabilities.

7.3 BUSINESS PHASE

The objective of this phase is to use the previous models: goal realization view and strategy view, combine with the program typology and match the most suitable program, based on the objectives, requirements, constraints and resources.

We use objectives as the first driver, requirements, and constraints as the second and, if there are more than one possible program, the resource offering. This phase is highly dependent on the Program Typology artefact.

In the demonstration, the programs that achieved the identified objectives were not possible due to constraints, so the selected program achieved only partially the objectives. This phase had success in showing which were the main resources accessed through the program and the resources offered by the company.

Without quantitative metrics and no quantitative decision method, if there were more than one program that offered the necessary resources, the method could provide a set of possible programs, without criteria to select the best, only possible with quantitative metrics. However, with only five program options, a detailed analysis of objectives, requirements, and constraints, together with a detailed analysis of each program should enable decision making without quantitative analysis, as each program have different characteristics. To guarantee that always only one program is selected, the list of requirements, suggested on the evaluation of the motivation phase should be created.

We used Archimate to model the TO-BE scenario and it provided all the necessary elements to model the relation between the business actors as well as the accessed resources and capabilities.

7.4 OVERALL EVALUATION

The method is highly dependent on the Program Typology. Our typology used exclusively secondary data, from the scientific literature and books. To improve the typology, an extensive study with primary data would enrich the research, including new dimensions such as Costs, Average Number of Partners, Control Degree.

The method has the benefit of speed and simplicity. With only one interview, it was possible to gather all the necessary information from the company and give results, as the most laborious work was already completed in the research of the typology.

This method presents a great alternative to preliminary decisions on collaboration programs with startups, defining the objectives achieved with each program as well as design characteristics. After the method, it is necessary to go deeper on the study of the selected program, designing it to meet contextual and operational requirements.

8 CONCLUSION

This work had the objective to support companies decide which collaboration program with new ventures is the most suitable for their needs. To solve the problem, we analyzed how companies can benefit from partnerships with startups and built a value-adding model. Using the theoretical background and the value-adding model, we characterized the available program models and established a baseline comparison table. This table, defining the objectives and design elements of programs supported the selection method that matched the company needs with potential program models. The selection method focused on strategic objectives achievement, requirements, and constraints.

Applied in a Portuguese telecommunication company, the method supports decision making showing which strategic objectives are achievable through collaboration programs (based on the typology) and relating achievable objectives with company's objectives. Ideal for a preliminary analysis, the program typology provides an overview of available programs and a fast selection method to match collaboration programs with existing objectives. After this analysis, the program should be designed to satisfy the company's needs, what is beyond the scope of the thesis.

The findings of this research are communicated through two ways. Firstly, the entire research, following the DSRM with all the content is published in the Thesis document, available to the public in the Instituto Superior Técnico platform. Secondly, a paper with the key findings of the research, presenting the program typology and selection method with the demonstration was submitted on the European Journal of Innovation Management (waiting response).

This research developed useful tools for innovation managers, it comprehends dozens of articles and books from the scientific literature regarding collaboration programs, summarizing it in only one standard table. Besides that, it created a method that combines the characteristics of programs, mainly the achievable strategic objectives, gathered from the literature, with the company's needs, using enterprise architecture. The company's motivation is described in Archimate modelling notation, with the goal realization viewpoint. Archimate 3.0 modelling notation proved to be a comprehensive enterprise architecture tools, supporting not only IT related topics, but also motivation and strategy elements.

The main limitations of this work related to the Program Typology are regarding data gathering. Without primary data, it was not possible to characterize programs in important approach and organization dimensions such as the costs, number of partners, financial results and restrictions related to the environment where the company is located. This missing data could generate a more robust typology, with quantitative metrics with better support to the selection method. Another important restriction of the Program Typology is the speed of change in existing programs. In such a dynamic environment, it is hard to create a snapshot of the current situation with programs evolving and new formats emerging.

Regarding the selection method, it is mainly constrained by the Program Typology. Quantitative metrics would improve the method, that could use quantitative decision making methods to select the most suitable program. Without quantitative selection, the method can result in two or more programs as possible and further research should be done to select only one.

Further research on this topic comprehends gathering primary data on existing collaboration programs and developing further the program typology, adding new dimensions and programs, and validating the existing ones. Data on costs, average number of partners and control degree can improve the quality of the typology and the selection method. Studies on resource-based view and dynamic capabilities can contribute to improve the value-adding model, describing which resources and capabilities are associated with the results of collaboration programs, measured in objectives achievement. The selection method could be improved with quantitative metrics, what would enable selection through decision-making methods.

After the program selection, the company should design the program, select startups to partner with and operate the program. All these areas are subtly studied on the literature. More research on design elements of programs is needed to support the implementation of programs. The RBV and dynamic capabilities theoretical background is promising to support the selection of new partners.

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APPENDIX A. Complete Program Typology

	Program	Innovation Contests				Independent Accelerator
	Type	**Hackathon**	**Market Explorer**	**Solution Seeker**	**Idea Generator**	**Venture Developer**
Objective	**Primary**	Strategic	Strategic	Strategic	Strategic	Financial
	Familiarity Matrix	All	New Market	New Solution	New Business	-
	Description	Explore digital solutions to existing business problems or a specific technology potential	Identify and explore new markets for existing technologies and capabilities	Prospect solutions for identified business problems	Generate business ideas that complement or support current business strategy.	Invest in promising startups, make them more valuable, and earn a financial premium
	Degree of Elaboration / Venture stage after program	Idea or prototype	Idea or prototype	Prototype or full solution	Idea or prototype	Startup phase
Approach	**Locus of opportunity**	External and internal	Internal	External	External and internal	-
	Strategic logic	Exploration	Exploration	Exploration	Exploration	-
	Industry relation	Minimum relation	Minimum relation	Strong relation	No minimum relation	-
	Revenue model	No revenue	No revenue	No revenue	No revenue	Equity (5-12%), possible fee
	Degree of Elaboration / Venture stage before program	-	-	-	-	Idea or startup phase
Organization	**Duration**	12 hours ~ 3 days	1 ~ 12 months	1 ~ 12 months	1~12 months	2 ~ 12 Months
	External partner	Partly	No	No	Partly	-
	Connection to parent	Part of parent	Part of parent	Part of parent	Part of parent	-
	Leadership experience	Internal	Internal	Internal	Internal	Internal and external
	Involvement degree	Support to understand the problem, strategic guidance	High mentorship on existing technologies and capabilities	Support and tools to understand the problem	Business support, strategic guidance	Intense mentorship on entrepreneurship methods and business expertise, network development, strategic guidance
	Example	Startup Weekend	IBM Innovation Jam	Netflix Prize	Cisco I-Prize	Y Combinator

Corporate Accelerator				Independent Incubator	
Listening Post	**Value Chain Investor**	**Test Laboratory**	**Unicorn Hunter**	**Coworking**	**Science Park**
Strategic	Strategic	Strategic	Financial	Financial	Public
All	New Solution	New Business	-	-	-
Understand recent trends and developments in a respective market and initiate relationships	Identify, develop, and integrate new products and services into parent company´s value chain	Create a protected environment to test promising internal and external business ideas	Invest in promising startups, make them more valuable, and earn a financial premium	Provide infrastructure to new ventures and profit from fees	Foster local economy and/or scientific community through innovation
Startup phase	Startup phase	Startup phase	Startup phase	Startup phase	Startup phase
External	External	Internal and external	External	-	-
Exploration	Exploration	Exploration	Exploitation	-	-
Medium relation	Strong relation	Minimum relation	No minimum relation	-	-
No revenue	Equity (5-12%)	Equity (5-12%)	Equity (5-12%), possible fee	Fee	Equity and/or fee. May have no revenues if public funded
Startup phase	Startup phase	Idea or startup phase	Startup phase	Startup phase	Startup phase
2 ~ 12 Months	2 ~ 12 Months	2 ~ 12 Months	2 ~ 12 Months	1 ~ 5 years	1 ~ 5 years
No	Partly	No	Partly	-	-
Part of parent	Part of parent	Separate legal entity	Separate legal entity	-	-
Internal and external	Internal and external	Internal	External	Internal and external	Internal and external
Intense mentorship on business and industry expertise, network development, strategic guidance	Intense mentorship on business and industry expertise, network development, strategic guidance	Intense mentorship on business expertise, minimum strategic guidance	Intense mentorship on entrepreneurship methods and business expertise, network development, strategic guidance	No involvement, shared infrastructure and resources between incubated ventures. Advisory paid on demand	Strategic and ad-hoc mentorship, network development, shared infrastructure and resources between incubated ventures
Microsoft Ventures Accelerator	TechStarts METRO Accelerator	Allianz Digital Accelerator	Axel Springer Plug & Play	Betahaus	Taguspark

	Corporate Incubator			Venture Builder	
University Incubator	**Fast-Profit**	**Future Builder**	**Value Chain Improver**	**Independent Builder**	**Corporate Builder**
Financial or Public	Financial	Strategic	Strategic	Financial	Strategic
-	New Market	New Business	New Solution	-	All
Commercialize university technology	Spin-off non core technologies for profit	Evaluate the potential of related new markets, technologies and businesses	Incubate new businesses for potential incorporation	Build ventures in a repeatable process. Leveraging economies of scale and accumulating expertise	Build industry related ventures in a repeatable processes. Leveraging corporate resources and accumulating expertise
Startup phase	Startup phase	Startup phase	Startup phase	Growth phase	Growth phase
-	Internal	Internal and external	External	Internal and external	Internal and external
Exploitation	Exploitation and Exploration	Exploration	Exploration	Exploration and Exploitation	Exploration and Exploitation
-	No minimum relation	Minimum relation	Strong relation	No minimum relation	Strong relation
Equity and/or fee. May have no revenues if public funded	Equity	Equity	Equity	Equity (50%+)	Equity (50%+)
Startup phase	Idea or startup phase	Startup phase	Startup phase	Idea phase	Idea phase
1 ~ 5 years	1 ~ 5 years	1 ~ 5 years	1 ~ 5 years	Long-term	Long-term
-	No	No	No	-	No
-	Part of parent	Separate legal entity	Part of parent	-	Separate legal entity
Internal and external	Internal and external	Internal and external	Internal and external	Internal	Internal and external
Strategic and ad-hoc mentorship, network development, shared infrastructure and resources between incubated ventures	Strategic and ad-hoc mentorship, network development, shared infrastructure and resources between incubated ventures	Minimum strategic influence, business expertise mentorship, network development, infrastructure and resources	Maximum strategic involvement, business expertise mentorship, network development, infrastructure and resources	Full control and support	Full control and support
CIENTEC	Siemens Novel Businesses	Next47 (Siemens)	Siemens Technology to Business	Betaworks	Kamet (AXA)

Independent V. Capital	Corporate Venture Capital			
Venture Capitalist	**Driving**	**Enabling**	**Emergent**	**Passive**
Financial	Strategic	Strategic	Financial, may turn strategic	Financial
-	New Solution or Business	New Solution	New Market or Business	-
Invest in promising firms, make them more valuable, and earn a financial premium	Invest in related ventures to leverage industry specific assets, sustaining current strategy	Invest in complementary firms to develop an ecosystem	Leverage company technologies in non-core markets, making "real-options" investments	Invest in promising firms, make them more valuable, and earn a financial premium
Growth phase	Growth phase	Growth phase	Growth phase	Growth phase
-	External	External	External	External
-	Exploitation	Exploration	Exploration	-
-	Strong relation	Medium relation	Minimum relation	No minimum relation
Equity (10-20%)	Equity (10-20%)	Equity (10-20%)	Equity (10-20%)	Equity (10-20%)
Startup or growth phase	Startup or growth phase	Startup or growth phase	Startup or growth phase	Startup or growth phase
Long-term	Long-term	Long-term	Long-term	Long-term
-	No	No	No	No
-	Separate legal entity	Separate legal entity	Separate legal entity	Separate legal entity
	Internal	Internal	Internal and external	Internal and external
Board level advisory, network development	Industry and technology expertise, board level advisory, network development	Industry expertise, board level advisory, network development	Technology expertise, board level advisory, network development	Board level advisory, network development
Sequoia Capital	Microsoft Ventures	Intel Capital	Mitsui Global Investment	Google Ventures