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Corporate-startup collaboration: effects on large firms' business transformation

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Abstract

Purpose – Corporations' emphasis on startup collaboration for corporate innovation has reached a new level in the context of digital transformation. The purpose of this paper is to examine three different models of corporate-startup collaboration and the models' effects on the case companies' capabilities for, and actual outcome in regards to their business transformations.

Design/methodology/approach – The theory and case studies on corporate-startup collaboration models are based on several years' empirical study on 30+ multi-national corporations in the Western world. Further, iterative literature reviews on digital and business transformation have been conducted, leading to the identification of two different, but complementing frameworks used to analyze each case's capabilities and outcome in regards to business transformation.

Findings – Collaboration with startups was found to positively affect the firms' business transformation. Further, the three-step analytical process is a valuable path to better understand, and improve, the cases' capability for, and outcome in regards to their business transformations.

Research limitations/implications – The paper includes three case studies and a new process for analyzing their effects on capabilities for, and actual outcome in regards to business transformation. More research is needed, both on cases and on how to refine the analytical process.

Practical implications – The practical contributions from this paper are the in-depth description of the three operational cases, as well as insights on how each model's set up (approach) can affect both capabilities for, but also level of business transformation. As a result, a company might need a portfolio of different startup collaboration initiatives in order to manage a more holistic transformation of their business.

Originality/value – The paper's main theoretical and practical contributions are further knowledge on organizations and organizational practices for corporate-startup collaboration, as well as a three-step process for analyzing each case's effect on the respective firm's capabilities for, and actual outcome in regards to business transformation.

Keywords Transformation, Digital, Business, Startup, Collaboration

Paper type Research paper

Introduction

New digital technologies are transforming every industry to such an extent that Bill Ruh, CEO of GE Digital, recently commented: "If you can't master the idea of digital inside your analog business you open the door to commoditization" (Lopez, 2018). This poses a serious challenge for many large, previously successful companies, which in times of discontinuous change may have difficulty innovating and even surviving (March, 1991). The problem seems to be that resources, processes and cultures meant to strengthen existing lines of business tend to stifle exploration of the new (Christensen and Overdorf, 2000). In fact, incumbents' internal context is not only a risk for increased inertia, but also path-dependency and many large corporations are

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unable to break free from their current organizational trajectory (Steiber and Alänge, 2015). Dorothy Leonard put it succinctly by saying that when the environment changes, the firm's core capabilities become core rigidities (Leonard-Barton, 1992).

A number of mature companies try, however to find ways to stay relevant in an age of digital transformation (Jackson and Steiber, 2019). They take for example steps such as creating cross-department authority for digital initiatives, realigning incentives to include metrics relevant to digital transformation, and developing business cases for technology adoption (Fitzgerald *et al.*, 2013). In most cases, however, these internal initiatives are not enough as the enterprise value, in an age of transformations, to a high degree is determined by management's ability to buy and/or build and re-configure assets and resources that yield enough enhancements (Teece, 2006) in a changing competitive landscape. These capabilities are by Teece (2006) labeled dynamic capabilities, and this framework has the ecosystem as the center piece of an analytical framework within which corporations can assess opportunities.

The logic behind putting the ecosystem as the center piece of the analytical framework is the expanding, and even changing knowledge base in most industries, that in turn change the locus of innovation to networks of learning, rather than in individual corporations (Powell *et al.*, 1996; Chesbrough, 2003; Santoro *et al.*, 2018; Onetti, 2019). According to both Powell *et al.* (1996) and Chesbrough (2003), there has consequently in the recent decades been a growth in partnering and reliance of different forms of external collaboration among organizations. In more recent years, the digital transformation of most industries has increased the emphasis on external collaboration, specifically with startups as a rather new source for new or complementary assets and resources (Spender *et al.*, 2017). For startups this strategic avenue is also of interest as it could be a way for them to overcome innovation diffusion challenges (Autio *et al.*, 2018). However, Powell *et al.* (1996) raised the issue that external collaboration may require different kinds of organizations and organizational practices to access the external community, and further, their entrepreneurial ecosystems (Drori and Wright, 2018). In regards to collaboration with startups, more knowledge on organizations and organizational practices for startup-collaboration is needed (Hogenhuis *et al.*, 2017; Spender *et al.*, 2017; Ojaghi *et al.*, 2019). Further, more knowledge is needed on how this specific kind of corporate-startup collaboration effects firms' digital transformation.

For these reasons, the purpose of this paper is to present and learn from three different operational cases of corporate-startup collaboration and investigate how each approach has affected respective large firm's capabilities for, and actual outcome in regards to business transformation.

The main theoretical contributions from this paper is both further knowledge on organizations and organizational practices for corporate-startup collaboration, as well as a three-step process for analyzing each case's effects on respective firm's capabilities for, and outcome in regards to their business transformation. The practical contributions from this paper are, the in-depth description of the three operational cases, as well as insights on how each model's set up can affect both capabilities for, and also level of business transformation. In fact, a company might need to develop a portfolio of different startup collaboration initiatives in order to manage a more transformative change of their business.

The sections below start with a *theoretical context* in which the core concepts used in this paper, the dynamic capabilities concept, and the concept of corporate-startup collaboration will be elaborated on. Further, a well-known framework from the early literature on IT-enabled transformation will be presented. Next come *research methodology* and a summary of the three empirical *case studies*. The following *discussion* analyzes the operational cases in three levels. First, a comparison is made based on their approach, evolution and integration with core business. Second, the three cases are discussed from a dynamic capabilities perspective as those capabilities do play a role for the firms' final transformation. Third, the three cases are analyzed based on the IT-enabled transformation framework presented in the section, "theoretical

context." Finally, *conclusions and implications*, as well as avenues for *future research* are presented.

Theoretical context

The Internet, cheap information processing and artificial intelligence, as well as cloud technology and Internet of Things (IoT), have not only shortened product life cycles in many industries but created a need among companies for assessing complementing or totally new assets and resources in order to stay relevant in a changing competitive landscape.

The dynamic capabilities framework

In a rapidly changing environment with an increasing pace of technological development, the large firms' dilemma is that; ". . .there is little evidence that industrial giants are needed in all or even most industries to ensure rapid technological change and rapid utilization of new techniques" (Teece, 2006, p. 1132). Further, innovation success is not so related to the innovator's ex ante market share, but; ". . .to the (complementary) asset structure of the innovator, management's market entry timing decisions, and the contractual structures employed to access missing complementary assets" (Teece, 2006, p. 1132). As a consequence, Teece (2006) introduced a new strategic framework for sustainable competitive advantages for larger firms. The new strategic framework is "Dynamic Capabilities" and it seeks to answer how a larger firm can stay competitive in a fast changing environment. This framework has ". . .the ecosystem as the center piece of an analytical framework within which companies can assess opportunities" (Teece, 2006). Also, O'Reilly and Tushman (2013) noted that a promising domain for innovation research is to move from the firm to its *ecosystem* as a unit of analysis, as innovation will increasingly occur across the larger community (Powell *et al.* (1996); von Hippel 2005; Schilling and Phelps 2007). As a consequence, Lakhani *et al.* (2012) noted that research is needed on firms' capabilities of leading *across boundaries*, as well as on identity issues that span firm-community borders as large firms relying increasingly on external technology and innovation, must develop the ability to manage resources that they do not fully control and there becomes a need for understanding how to cultivate ecosystems (Steiber and Alänge, 2013b; Furr *et al.*, 2016).

The strength of small technology startups, as a part of large firms' ecosystems, is their ability to develop new ideas rapidly and test them with early-adopting customers, while a main weakness is limited ability to scale up for high-volume operations. Large firms typically show the opposite areas of strength and weakness. That has led some authors to suggest forms of cooperation in which the firms play interactive and complementary roles (Rothwell and Dodgson, 1991; Prashantham and Birkinshaw, 2008). Weiblen and Chesborough (2015, p. 67) reported: "During the last few years. . .corporate efforts to reach out to the startup ecosystem seem to be on the increase. In its quest for speed and innovation, the tech industry, in particular has produced a variety of ways of engaging with startups." To explain this phenomenon, the authors refer to Peter Diamandis and Singularity University and their claim that exponential technologies are impacting us faster than we realized, and therefore large tech firms must tap into the startup ecosystem in order to "move much faster, lest they be left behind in the changing landscape" (Weiblen and Chesborough 2015). The same conclusion is drawn by Drori and Wright (2018), and by Piccinini *et al.* (2015). Piccinini *et al.* (2015) identified the importance for large automotive firms of being part of the construction of totally new entrepreneurial ecosystems. The authors specifically identified emerging challenges from "completely new and non-industry rivals, such as technology startups, which have more knowledge and experience with digital products and services than automotive organizations" (p. 10).

However, Rothwell and Zegveld (1982, p. 111) had warned: "Because of the very different behavioral characteristics of large and small firms, such a relationship can be fraught with problems." Years later, Chesbrough (2002) noted that large companies often saw the value of investing in external startups; the trouble was that "More often than not, though, they just can't seem to get it right." And interviewees in Chesbrough's (2012) study of GE commented that it is inherently hard for very large companies to work with startups. There are many reasons for this, one being a lack of "startup-friendly procedures" such as shortening payments times, simplification of vendor registration and qualification process (Onetti, 2019), another the "creative thinking style" used by larger firms, compared to innovative startups (Campos *et al.*, 2015). Paradoxically, this last issue is the very reason why many large firms need to collaborate with startups, as increased creativity is a strategic choice firms have to make in an increasingly uncertain and dynamic economy (Amabile, 1996). Of interest for this paper, some large firms have successfully combined their market strength with the nimbleness and creativity of external small firms, but they are not numerous.

Models for corporate-startup collaboration

Due to the increasingly important role startups play in corporate innovation, research has been conducted on different ways corporates collaborate with startups. In 2015, Weiblen and Chesbrough (2015) introduced a typology of different corporate-startup collaboration models. The framework used two dimensions; the direction of the innovation flow (from the "outside-in" or from the "inside-out"), and if the large firm take equity or not in the startup. Based on several-years' empirical study of 30 large firms' collaboration with startups, Alänge and Steiber (2019) later validated and expanded Weiblen and Chesbrough (2015) typology by introducing four additional models for corporate-startup collaboration. The end result became a typology including *eight different models* for corporate-startup collaboration, clustered into four main categories of corporate-startup collaboration models (Alänge and Steiber, 2019). The four categories and eight models are:

(1) Outside-In and Equity based: Corporate Venture and Corporate Acquisition

(2) Inside-Out and Equity based: Corporate Incubator and Internal Accelerator

(3) Outside-In and Non-Equity based: Co-creation and Co-location

(4) Inside-Out and Non-Equity based: Platforms and Startup Programs

Below each category and its models will be briefly described.

Category 1: Outside-in and equity based. A *corporate venture unit is* investing in external startups of strategic interest, which may be acquired at some point. *Acquisition* in general is a common way of obtaining assets developed elsewhere – including technology, talent, competencies, and/or patent portfolios (Steiber and Alänge, 2013b).

Category 2: Inside-out and equity based. Large firms have realized the need for rapid learning, and therefore use probe-and-learn processes with success, primarily in computing and Internet companies (Lynn *et al.*, 1996; Brown and Eisenhardt, 1998; Steiber and Alänge, 2013a, 2015). More recently, the work of Steve Blank and Eric Ries (Blank, 2005; Ries, 2011) has popularized the "lean startup" methodology, which has influenced the design of *corporate incubators*, where internal ideas may lead to spinout companies, which put internal assets to use and can also potentially be re-acquired later. In contrast to a corporate incubator, an internal *accelerator* can be viewed as an intensive, brief program in which cohorts of internal idea providers are trained to take their ideas further. These accelerators are focused on very early-stage innovation, and in many cases on contributing to a shift toward an entrepreneurship and innovation culture in respective corporation.

Category 3: Outside-in and non-equity based. Recently there has been a growing interest in *co-creation*[1] through open innovation (OI) units at large firms. This function usually does not, in itself, involve investments in startups. Rather it involves interaction with them to mediate access to ideas, innovations, and competencies (Steiber and Alänge, 2013b). The function (or parts of it) can be performed by a dedicated Open Innovation unit or by various internal units such as technology offices, IP offices, and industry solution labs (Gassmann and Enkel, 2004). Another form of co-creation is crowdsourcing ideas from broad populations of developers, makers, and/or users. Crowdsourcing of ideas is increasingly practiced, both within organizations and in larger communities, and there are two basic approaches to it, a clearly defined problem can be presented for solution, or general challenge areas for innovation can be presented to invite broader idea generation. Terwiesch and Ulrich (2009) argued for the use of innovation tournaments to systematize the sensing, screening and evaluation. Another form of co-creation involves hackathons at large firms, or even physical locations, where idea providers/startups can generate, prototype, or further develop their ideas within a very short time.

Some large firms have created labs or workspaces for small firms in their vicinity ("the corporate version of the Maker Movement"). The idea in many of these cases is to *co-locate*[2], so the small firms can benefit from access to the larger firms' competencies and resources, while the larger firms develop relationships that could provide useful innovation inputs (Remneland Wikhamn and Styhre, 2017). Co-location has also been used with software developers, to stimulate them to write applications based on the large firm's software. This can expand the market reach of the software while helping the large firm develop its ecosystem (Gawer and Cusumano, 2014).

Category 4: Inside-out and non-equity based. By *platforms* it is meant a large firm's proprietary platform, e.g. Android or iOS, and the primary purpose of setting up a *Startup Program* is for the large firm to support entrepreneurs with access to the large firm's products, services, or other assets.

In summary, these four categories and eight different models are examples on how large firms utilize startups to access new or complementary assets and resources, important for corporate innovation in general, and specifically for their digital transformation.

A framework for digital technology-enabled business transformation

Referring back to the dynamic capabilities framework, it pinpoints three separate functions that need to be performed at the enterprise level to sustain success: sensing, seizing, and re-configuring (Teece, 2006). With sensing, the author refers to activities such as; identifying and interpret opportunities or threats. Seizing opportunities is to mobilize resources and provides decision rules for how the company can act to capture the opportunity and with re-configuring the author refers to the firm's constant renewals or major transformations needed due to changes in the external environment. According to Teece (2018), the main challenge in the context of digital transformation of corporations, is not the incremental innovations due to digital technologies, but to fully exploit the new technologies' transformative potential (Teece, 2018).

One stream of research that has discussed different levels (evolutionary to revolutionary) of IT-enabled business transformations is research in the area of strategic management and information technology. In Venkatraman (1994), a framework of IT-enabled business transformation is presented. The framework was developed in a preliminary version as part of the author's MIT's Management research project in the 1990s (Scott-Morton, 1991; Sauer and Yetton, 1997). The framework, is based on two dimensions: the range of IT's potential benefits and the degree of business transformation, see Figure 1.

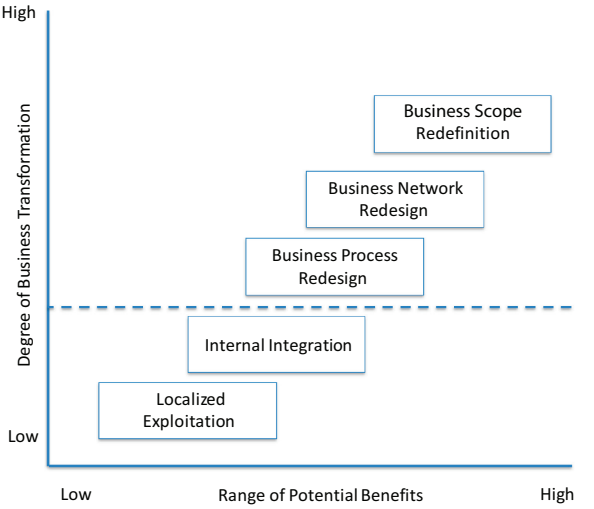

Figure 1.
Five levels of IT-enable business transformation (Venkatraman, 1994)

Below each of the five levels will be briefly described.

Localized exploitation (evolutionary level). Localized exploitation is according to the author the very first level in a business transformation, enabled by IT. In this phase the company enables IT by deploying it in isolated systems such as, e.g. inventory control system. The decision and implementation is decentralized to the appropriate function, operational manager. The result is isolated learning of benefits and limitations from such initiatives.

Internal integration (evolutionary level). The second level is reflecting a more systematic attempt to leverage IT throughout an entire business process. According to the author, this level integrates technical interconnectivity and business process interdependence. Both types of changes are needed on this level.

Business process redesign (revolutionary level). On the third level, IT is used as a lever for designing the new organization and business processes. This level is based on the rationale that the benefits from IT are not fully realized if superimposed on the current business processes.

Business network redesign (revolutionary level). The three levels above focus on IT-enabled business transformation within one single organization. On the fourth level of transformation, IT enables interconnections and integrations with external partners such as suppliers, customers, and other intermediaries.

Business scope redefinition (revolutionary level). The final level is reached if the firm utilizes IT to influence their business scope and the general logic of their business relationships. According to the author, this last level is dependent of a redesign of the firm's business networks (level 4), that is that the company moves from transaction processing to knowledge networks. Technology in this phase redefines the rules of the game (Venkatraman, 1994, p. 84).

In the discussion later on, three of the eight identified models will be analyzed in three steps: organization and organizational practices; use of or development of dynamic capabilities; and degree of business transformation, and potential benefits from new innovations generated through each company's startup collaboration.

Methodology

The authors' research began in 2014 with an initial search for approaches for large firms to accelerate corporate innovation by collaborating with startups.

The authors followed an abductive approach (Dubois and Gadde, 2002), in which the empirical research began with identifying and contacting large companies that use various models to accelerate innovation via interaction with startups. The large companies were identified by attending the annual World Open Innovation Conference (WOIC) in 2015–2017, by discussing with Vinnova (the Innovation Agency of Sweden) that had, or was to fund several Swedish corporations with startup collaboration initiatives, and by conducting iterative searches on Internet, and on previous research literature.

The primary data was collected through one- or two-hour in-depth, semi-structured face-to-face interviews with the manager in charge of the selected companies' innovation-accelerating "unit," as well as through personal visits to several of the units, These "units" had as their responsibility to identify and get access to externally generated innovations developed by startups, and/or internally generated ideas from employees that were to be develop into new growth areas. Data collection took place from 2014 to 2017 and included 30 European and U.S. multinational companies. Through interviews with these 30 corporations (in average two in-depth interview per company that was followed up by additional questions and answers in emails), eight different models for Corporate-Startup collaboration were identified. These identified models were then compared to previous research, including the models presented by Weiblen and Chesbrough (2015). In order to create a systematic, easy-to-use framework, the authors choose to build their work on the typology developed by Weiblen and Chesbrough (2015). As a result an extended typology was presented and discussed in Alänge and Steiber (2019). In 2017, a follow-up study was initiated and funded by Vinnova. The follow-up study involved initially seven, and later nine Swedish multinational corporations. Four of the nine were part of the earlier research mentioned above and five were totally new. The goal of the follow-up study was to get a deeper understanding of the previously eight identified models for Corporate-Startup collaboration. Data from the follow-up project was collected over eighteen months in 2018–2019, primarily through nine full-day workshops at each of the participating company's sites, in which participants (1–3 people) from each of the companies participated, as well as three startups that were invited by the host company (21 startups in total were involved over the two years). The startups provided a small firm perspective on the collaboration models with the large firms.

The cases used for this paper were then selected based on three criteria (Eisenhart and Graebner, 2007):

(1) Each case demonstrated a novel way of conducting innovation activities in collaboration with startups.

(2) And, each selected case represented a different organizational solution, which allowed for analyzing similarities and differences between the cases.

(3) Each was perceived by the company as showing visible results on the firm's digital transformation.

The three case companies are AstraZeneca and their BioVentureHub (co-location), Stena Metall New Ventures (corporate venture), and Electrolux's Open Innovation unit (co-creation). Though the cases differ greatly in regard to approach, they have one thing in common. At all three companies the new approach was driven by top leadership, in order to *transform the firms* more rapidly by expanding the locus of innovation from their traditional processes, such as internal R&D, to include a specific section of the external community: small technology companies.

After the selection of the three case studies, the authors returned to each company for further empirical and secondary research, now in the context of digital transformation of the large firm. This consisted primarily of an additional in-depth interview with the manager of the innovation unit in each company, along with follow-up emails and gathering of additional

information from secondary sources on the web and in print. The data collected from company interviews, as well as from follow-up emails and second sources, is synthesized in the following section on "three case studies." In order to validate the accuracy of the data, each case has been quality assured by respective company.

Three case studies

Following are summary descriptions of the three operational cases of corporate-startup collaboration.

AstraZeneca's BioVentureHub

AstraZeneca has long succeeded globally by developing biopharmaceutical products in-house, including the gastric acid inhibitor Losec, which became a top-selling drug worldwide. Today, however, AstraZeneca is very much aware of a major ongoing transformation of its industry. This transformation is driven by changes in technologies including digital health, medical diagnostics and treatment devices, as well as in the way products are being developed. Combined with the use of new distribution channels and emergence of new business models, these changes constitute a major challenge for all large pharmaceutical firms.

AstraZeneca has responded by addressing digital transformation at the corporate level. In an interview with the industry magazine *PM360* (Matthius, 2016), the company's Executive Director for Strategy and Innovation said: "At AstraZeneca, we are developing a Global Business Strategy for a digital world. We know that digital capabilities can drive relevant patient-centric business. We believe a single, focused strategy that includes better utilization of our data will enable digital products and services to play a greater, more integrated role across the business, and impact health outcomes and performance while still putting patients first." Of the many initiatives that make up this strategy, our case focuses on perhaps the most radical.

Traditionally, R&D units in pharmaceutical corporations have been closed and top-secret, characterized as similar to Fort Knox. In 2014, AstraZeneca totally revised this approach by locating a new separate unit – the AstraZeneca BioVentureHub, hosting *external* companies – at the center of its research facilities in Gothenburg, Sweden. Since the BioVentureHub was a pioneer, it had no direct role models and needed to develop its own approach while starting. In November 2018, the BioVentureHub housed 27 external firms. Most could be described as mature startups, but some are well-established companies, including units of other large multinational firms from adjacent industries.

Employees of the external companies have access to research facilities and human capital within AstraZeneca R&D. Co-locating them on a corporation's own premises can provide opportunities for serendipitous encounters and unplanned roads towards radical innovation. The Hub's central location next to the facilities' main restaurant makes it even more conducive to serendipitous exchanges.

The basic idea is to invite more proven startups which have an ambition to grow, and can benefit from access to AstraZeneca resources when these are idle. The selection criteria are that they have secured their own funding, and bring science that can lead to synergies and some level of complementarity to other companies in the Hub. AstraZeneca BioVentureHub does not preselect companies that fit into its present strategies. Rather, the view is that interaction with companies in the Hub can, through serendipity, lead to future (and perhaps unexpected) benefits for AstraZeneca in terms of new technological solutions, work processes or business models.

Companies in the Hub are active in several areas that could potentially lead to innovation cooperation, although sometimes their target markets can be very different from AstraZeneca's. For example the Hub admitted a company producing antifouling paint for boats, because its

design principles were of interest. AstraZeneca has already seen benefits from serendipity. For example, one small pharmaceutical firm questioned the traditional steps in the process for obtaining approval for new drugs. The firm developed its own simplified preclinical test method, which initially AstraZeneca's experts did not think would be accepted by the authorities. However, it was, and after seeing the benefits to the smaller firm, AstraZeneca changed its own approach, leading to considerable gains.

Another result is that AstraZeneca has entered into three digital cooperation projects with one of the well-established companies in the Hub, the US firm MentorMate, which has 17 years' experience in creating digital solutions for healthcare. In one of these projects AstraZeneca has developed a system aimed at improving quality of life for patients with extreme asthma. A digital patient-monitoring system measures in-body, on-body, and external variables that may affect a person's wellbeing and risk in case of an asthma attack. The data collected from initial trials is used for the development of AI-driven algorithms that can provide risk forecasts for individual patients. AstraZeneca leaders have also had the opportunity to discuss their digital strategies with people at MentorMate, as part of the Hub's philosophy of companies assisting each other.

The BioVentureHub's mission is to create a unique ecosystem and to support promising smaller companies in their efforts to develop and grow. Therefore it is organized as a separate not-for-profit company, and can receive government funding in order to symbolically reimburse AstraZeneca's R&D personnel for the time they spend giving advice to guest companies. As such, the Hub has not been associated with any operational costs for AstraZeneca. However, as benefits to the host company are identified over time, external funding might be of less importance for the Hub's continuation.

Stena Metall's New Ventures

Stena Metall AB is a multinational company with specialized subsidiaries that have long histories in recycling, working and selling metals and other materials. Separating scrap materials more efficiently in order to recycle is a challenge globally, and the industry is increasingly relying on new digital technologies including VR/AR, image analysis, and AI. In Stena Metall's 2017–2018 annual report, the CEO wrote: "In line with broader developments in society, we are carrying out digitalization work in all of our companies in order to create even greater value. We are developing and optimizing our IT systems and processes, with the aim of increasing the availability of our products and services and providing support for customer improvement work. Digitalization also streamlines our internal production flows, enhances interactive solutions with our customers and increases the opportunities to create additional value."

Stena Metall has organized a corporate Digital Transformation Team with responsibility for the overall digitalization strategy, which includes funding proof-of-concept projects. Further, each company in the Stena Metall group has digitalization teams that can access the corporate fund to test new ideas that go a bit beyond the more incremental innovation in customer projects. Most of the digitalization development is conducted in cooperation with suppliers, both large and small firms, and in close cooperation with customers. In total there are more than 100 smaller projects on customer portals, sales systems, robotized invoicing, E-commerce, and transport planning.

In 2016, Stena Metall AB created its New Ventures unit to further expand the existing range of services by investing in startups, spinning out internal ideas, and creating startups together with other companies. The main focus of the New Ventures unit's own activities is on what is coming 2–4 years ahead. However, the unit also supports Stena Metall's R&D organization by constantly following what might happen 4–8 years ahead, as well as supporting existing operations by scanning what may happen 0–2 years ahead.

New Ventures started as unit to develop internal and external ideas in-house, as well as together with external incubators and accelerators, but has broadened its mission to include

corporate venturing with possibilities for acquisitions. This means that in terms of the Alänge and Steiber (2019) framework of operational models for startup-corporate collaboration, the New Ventures unit has a responsibility for both outside-in and inside-out models that include equity investments.

According to New Ventures, its focus is on internal and external ideas that do not fit into existing companies within Stena Metall, but would benefit from being connected to the Stena Metall group. This includes "temporary risk-projects" for existing Stena Metall companies, with separate budgets and with license to fail to gain speed. Teams are put together for each project. New companies can be started if needed, and they can involve co-working and co-owning with external firms.

New Ventures invests in startups supporting Stena Metall's future business. The benefits for the startups are: access to technical and marketing know-how, client connections, capital, and opportunities to test their idea live. Recently, Stena Metall constructed its Stena Nordic Recycling Center in Halmstad, Sweden, where startup companies are invited to locate for periods of 1–6 months. Proximity to a large industrial recycling facility, with access to an experienced staff, materials, operations, and data, gives the startups excellent opportunities to test ideas and prototypes. The goal of this Recycling Lab is ultimately to develop functional solutions for customers, which sometimes may also be done together with larger partners such as ABB, Ericsson, and Siemens.

The New Ventures unit plays an important part in Stena Metalls' transformation. One example is the launch of Repur AB (www.repur.se), a co-owned startup in the recycling industry. Other examples are the development and investment in Halosep – an innovative method for recycling and reuse of waste streams from incineration plants – which was developed within Stena Recycling and will require a new setup for further distribution; and investment in BioImpakt AB, a company involved in water analysis using IT development, machine learning, and testing of efficiency of analyses, which after the investment has been guided to an external incubator at the University of Örebro. Another example is BatteryLoop Technologies AB, a startup founded by Stena Recycling AB together with the external startup Ferroamp, which has power electronics and energy storage solutions for renewable energy systems.

Part of the deal flow reaching New Ventures consists of startups already having commercial relationships with some of the companies within Stena Metall AB. One example here is Refind Technologies AB, specializing in image interpretation/analysis, and another is Machine2Machine Solutions AB, a company involved in developing a digital system for measuring the content level in waste bins and transmitting this data through local energy- and cost-efficient radio communication.

The New Ventures approach is to develop collaboration with startups in a flexible way – probing and testing, using an array of models and instruments, in order to gradually evolve the relationship through a learning process. The role of top leadership is central for the New Ventures unit, which has strong support both from operational leaders at Stena Metall and from the owners[3]. This is expressed through a strong intention to do something new, which leads to fast decision-making on funding of new initiatives in combination with investment endurance.

Electrolux open innovation function

Electrolux is a global manufacturer of household and professional appliances. The home and professional appliance industry is facing a major challenge combining IoT connectivity of products with new technologies in areas including radiofrequency, robotics, AI, sensors, and machine learning. This means that as in many other industries, digitalization is a key driver that also will contribute to new business models.

Electrolux's focus areas for digital transformation are described as the five pillars: (1) Digital 360° consumer shopping/ownership experience, (2) Connected experience, including

new business models for an ecosystem of smart connected appliances, (3) Digital productivity, (4) Modularization and digital manufacturing, and (5) Digital supply chain. The digital transformation is driven by different group functions, including the use of strategies such as partnerships with other large firms and universities, as well as leveraging the Open Innovation function. In this case the focus is on the role of the Open Innovation function[4]. It was established in 2011 with the mission to move beyond traditional networks of partners, such as customers and suppliers, and build new networks with private inventors, spin-offs, entrepreneurs, SMEs and startups, as well as with universities and large corporations in other industries.

The Open Innovation function was staffed by people who had both technical and business competence and mindset along with the ability to build reliable relationships, and a structured approach for an effective open innovation model was developed.

Direct access to decision makers proved to be an early success key. This helped avoid bottlenecks and allowed Open Innovation to act as a true boundary spanner between external partners and internal stakeholders such as R&D personnel, product-line managers and industrial operations staff.

Electrolux leaders wanted the new function to focus on the external landscape – an outside-in approach. The plan was that the company would focus internal resources on strategic areas that had already been identified as promising, while the Open Innovation function would complement these efforts by finding external capabilities as well as exploring new potential focus areas. Priorities for open innovation were constantly and proactively screened and adjusted, together with internal stakeholders.

The Open Innovation function developed a method for increasing the firm's capacity to absorb outside ideas, by asking internal stakeholders to define what they need. As a next step those needs were directly investigated by the Open Innovation team as well as shared with external partners, who then could identify innovations matching the needs. The processes for searching and screening ideas, and for selecting brokers, are therefore very systematic.

The Open Innovation function has used a probe-and-learn approach to develop its praxis. Early on, the team developed an "Open Innovation strategy" consisting of three main pillars: *Challenges*, *Networks*, and *Mindset*. A fourth pillar appeared necessary, and was added: *Execution Support*. This emphasized the importance of integrating new opportunities into existing businesses by working side-by-side with external players who provided the innovations, sharing capabilities and assets as required, and thus turning opportunities into actionable solutions.

Challenges are of two types, targeted and inspirational. Targeted challenges are specific problems for which the company wants solutions from outside players. Challenges of this type are addressed through dedicated and specialized intermediaries, supporting OI challenges and offering OI services. The team also has learned that these external partners can provide support when it comes to intellectual property rights, avoiding spillovers of confidentiality, which can be an issue when using external innovations. The Open Innovation team has made global alliances with some of these partners to manage challenges in a more systematic way.

Inspirational challenges are less defined but aligned with one or more of Electrolux's strategic areas. The Open Innovation team has in this case built relationships with new kinds of partners, so-called interfaces – such as *VCs, banks, and incubators* – that are efficient in searching, screening, and bringing innovations to the firm, as they have extensive and specific networks of innovators and robust systems for finding and vetting the innovators.

While focus areas for the Open Innovation team are based on requests from various internal units, these requests are increasingly prioritized by strategic importance, and since 2018 there is a strong emphasis on contributing to digital transformation of the company. Previous requests have primarily concerned digital productivity and manufacturing, with the

Global Director of Digital Industrial Operations being a key internal customer and cooperation partner. In this work, the Open Innovation team has identified a number of startups with promising technologies, and cooperation has been initiated between the startup and Electrolux. One example is the collaboration with OI3solutions, a software firm that started its first pilot with Electrolux in 2013, building software tools for operations, a logistics activities scheduler utilizing machine learning, and a digital problem solving solution. Another example is the startup AzzurroDigitale, which supports Electrolux's digital transformation. One example of how it helps is the startup's "Blue Wave" concept. The Blue Wave is a program that takes place over the course of 30 continuous hours, in which 40 selected talents work in groups to bring new ideas to a large company, supported and inspired by the AzzurroDigitale team and the company's managers.

In 2018, Electrolux expanded the scope of Open Innovation's work by creating an "Innovation Factory." This is a physical facility to foster, *inter alia*, collaboration with external and internal partners – but in particular to accelerate, together, open innovation projects that address specific Electrolux challenges, starting from innovation opportunities proposed by outside players. Situated inside the Electrolux plant in Porcia, Italy, the Innovation Factory began with five startup firms, selected through an international call for innovation and screened using the Open Innovation process. The initial focus is on digital-driven design and manufacturing technologies, with the aspiration to even give birth to new innovations (Electrolux, 2018).

Discussion

In this section, the dynamic capabilities framework and its three separate functions for sustained competitiveness: sensing, seizing, and re-configuring (Teece, 2006), as well as the framework "Five levels of IT-Enable Business Transformation" (Venkatraman, 1994), will be used in analyzing the three cases described in the previous section. First, however, the three cases will be compared based on their approach, evolution and integration with core business. The reason for this is that the approach, its integration with the core business, and its evolution over time, can either directly affect, or indicate a need for improvements in the firm's dynamic capabilities and level of digital transformation. Table I and the following discussion will therefore be used as step one in the analysis of the cases.

Five aspects of the approach are considered: the *direction* of the stream of innovations (outside-in or inside-out), whether *equity* is taken in the startups, degree of *separation* of the new approach from the main business (which can impact direction of innovation, e.g. degree of novelty compared to existing solutions), *resources* for the approach (which can affect, e.g. search strategy and therefore sensing capabilities of the firm), and finally the new solutions' *closeness* to the company's core business (which again can affect degree of novelty, or distance from existing solutions). *High* closeness means innovations that add value to current products and processes (incremental innovations), while *low* closeness means innovations that can become new growth streams or totally new businesses (major or even radical innovations).

Further, the evolution of each approach, that is how the approach has changed or expanded from inception to the end of the research period in late 2018, is described. Finally, the integration of the new organization is described and includes aspects such as top management's commitment to the new organization, the participation of people and resources from core businesses, and startups' access to these people and resources.

The approach, evolution and integration

All three approaches are outside-in; that is, they are primarily geared to finding and developing external ideas that benefit the large firm. Stena Metall is currently the only case company also using an inside-out approach, in the form of spin-outs placed in external

Table I.
Comparison of three cases of corporate-startup collaboration

	AstraZeneca BioVentureHub	Stena Metall New Ventures	Electrolux open innovation
Industry	Life sciences pharmaceuticals	Recycling metals and materials	Manufacture of household and professional appliances
Approach	Outside-in No equity Structural separation but physical co-location of startups in AstraZeneca's own R&D facilities in Gothenburg, Sweden Use internal resources for search and selection of startups that secured own funding and bring complementary science to the Hub Startups have low closeness to today's core business	Outside-in and Inside-out Equity, spinouts/start of new companies/ investment in startups Structural separation Use internal resources for search and selection of startups Startups have primarily medium closeness to today's core business	Outside-in No equity For the function, no structural separation Use of non-traditional external partners such as VCs, banks, and incubators, acting as brokers of startups High closeness to core business. OI complements R&D and BU efforts
Evolution of approach	The Hub was created to create a unique ecosystem and support growth of small, promising startups. The approach has evolved toward more mature startups and companies that can benefit from access to AstraZeneca's resources The BioVentureHub was initially supported by the Swedish government. External funding might be of less importance for the future as a result of the Hub's clear benefits for the company	Started as a unit to develop both internal and external ideas in-house, as well as together with external incubators and accelerators. Expanded the mission later to include corporate venturing and acquisitions of startups Has also developed a co-location hub, the Recycling Lab, close to Stena Metall's new Nordic Recycling Center in Halmstad, Sweden	The initial OI function has been complemented with an incubator (Innovation Factory) for co-location of, and collaboration with external startups The three strategic pillars of the OI strategy have been complemented with a fourth, Execution Support, to increase likelihood of integration of new solutions

(*continued*)

Table I.

	AstraZeneca BioVentureHub	Stena Metall New Ventures	Electrolux open innovation
Integration with main business	Top management commitment. The Hub is aligned with overall digitalization strategy Companies are selected after an internal evaluation Specialists from R&D involved as advisors to startups Startups can use AZ's research equipment when idle	Top management commitment. New Ventures is aligned with the CEO's increased focus on digitalization and the Group's digital transformation initiative and its corporate fund The focus is on ideas that don't fit into existing businesses, but would benefit from being connected to the Stena Metall group. Includes "temporary risk projects" for existing Stena Metall companies, with a separate budget and license to fail to gain speed The startups get access to technical and marketing know-how, client connections, and capital; can test their ideas live	Top management commitment. The Open Innovation function is aligned with corporate's overall focus on digital transformation Direct access to decision makers proved to be the early success key A wish list is created by internal stakeholders and then used in the search process
Impact on digital transformation	AstraZeneca is, through the Hub, actively searching for new capabilities for the future AstraZeneca has already seen benefits and has, based on an innovation from a startup, changed its own preclinical test method, leading to considerable gains. Further, it has entered into three digital cooperation projects with one of the more mature companies in the Hub	Examples are: The launch of Repur AB (www.repur.se), a co-owned recycling startup Investment in, and external incubation of BioImpakt AB, involved in digital-based water analysis. Co-founding of BatteryLoop Technologies AB, in concert with external startup Ferroamp Internal development of and investment in new Halosep process for recycling waste from incinerator plants	Complements R&D, product lines and operations in five key areas for digital transformation: Digital 360-degree consumer shopping and ownership experience, Connected experience, incl. new business models, Digital productivity, Modularization and digital manufacturing, and Digital supply chain Currently collaborates with, e.g. OI3Solutions and AzzurroDigitale to speed up digital transformation of Electrolux

accelerators or incubators. One could expect to see the outside-in approach dominating, as the "…growth and increasing viability of startup firms, and their attendant disruption, create a new imperative to develop more agile, rapid means for large companies to engage with the startup community" (Weiblen and Chesbrough, 2015, p. 68)

AstraZeneca and Stena Metall have chosen approaches that are structurally separated from the core businesses, while Electrolux made its Open Innovation initiative a function of the firm. However, Electrolux's new complementing initiative, the "Innovation Factory," could be viewed as structurally separated from the company's main operations. In the case of Stena Metall, the structural separation stems from an idea and approach, corporate venturing, that has been around for decades (Weiblen and Chesbrough, 2015). This setup provides the flexibility, speed, and freedom required to operate in the fast-moving venture capital world. In the case of AstraZeneca, the structural separation resembles, e.g. the approach chosen by AT&T Foundry (Weiblen and Chesbrough, 2015). The differences are that AstraZeneca has located its BioVentureHub at the center of its own R&D facilities in Gothenburg, and has structured it to look for non-core solutions and positive effects of serendipity by locating complementing startups close to each other.

Stena Metall New Ventures commercially collaborate, or invests in startups, while Electrolux chooses to commercially collaborate with them, and the BioVentureHub is open to both investments and commercial collaboration in case there are innovations evolved through serendipity.

According to Weiblen and Chesbrough (2015, p. 70), influence through equity is the traditional model of engaging with startups: "The idea of corporate venture capital has been around since the 1960s" In these authors' view, we would therefore say Electrolux and AstraZeneca have established a more non-traditional model of startup engagement. However, it is important to remember that Stena Metall's approach is not a classical corporate venture business as the overall goal is to search and invest in innovations important for Stena Metall's business transformation rather than only seeking a high return on investment.

As a complement to direct scouting, Electrolux uses a broker model with non-traditional partners such as venture capitalists, corporate banks, and incubators, in order to scan for interesting tech startups. Building such an external network is a way for firms to identify, work with, and monitor larger numbers of startups. This is particularly important when startup ecosystems around new technologies are growing bigger and more dispersed globally (Weiblen and Chesbrough, 2015). AstraZeneca and Stena Metall conduct their own scanning and search processes, and so far have not built an infrastructure of formally contracted external brokers/partners for that purpose.

Finally, regarding the three companies' innovation focus, the BioVentureHub consciously targeted non-core innovations. Stena Metall on the other hand target innovations that have medium closeness to today's business and could be applicable in some of the group's businesses within 2–4 years. However, the New Ventures unit is also supporting both R&D and current operations by scanning the market for interesting technology innovations relevant today to the respective organizations. Electrolux mainly targeted innovations closer to the company's current businesses. Referring back to Campos *et al.* (2015) and their work on creative thinking styles (adaptive versus innovative), they found that startup founders applying a thinking style that prefers to generate original ideas when confronted with a problem is strongly related to innovative entrepreneurial opportunities, rather than incremental entrepreneurial opportunities (p. 3). The BioVentureHub's conscious targeting of none-core innovations might therefore increase their probability of attracting and selecting truly innovative startups as those rely less on existing patterns to make things better. The opposite would then be the case for Electrolux. However, even if each case has a different innovation focus, all three companies perceive that they have invested in, or collaborated with, startups important for their business transformation.

In all three cases, the approach has evolved and developed over time, as it is hard to get everything right from start. This "learning approach" has been identified as important in general change management theories (Steiber and Alänge, 2015) as well as in previous research on digital transformation: "For the organization's capability to be innovative and to focus on a development-orientation in general, continuous learning is the most important precondition" (Schuchmann and Seufert, 2015). AstraZeneca's BioVentureHub evolved as its leaders learned to focus on more mature startups, or startups with more proven business models that could be strengthened by access to resources within AstraZeneca.

Stena Metall's New Ventures started with a broad mandate – developing both internal and external ideas of interest, either in-house or together with external incubators and accelerators – then expanded further to include corporate venturing and acquisition of startups. In the last year, Stena Metall has also invested in the Recycling Lab at Stena Nordic Recycling Center, where startups can co-locate to test new recycling technologies. Finally, Electrolux has evolved its approach by expanding the Open Innovation function by launching the Electrolux Innovation Factory, at which startups can co-locate and collaborate.

Thus, all three approaches are developing over time as the companies augment their original approaches with refined, or complementary ones, which expand their efforts into new categories of corporate-startup collaboration models. This evolution has been identified in previous research on startup-corporate collaboration. For example, Weiblen and Chesbrough (2015) found that their identified models for collaboration are "not mutually exclusive . . . As they serve different goals. . ." (p. 85).

Finally, as noted earlier, the integration of externally developed ideas has been found difficult in many corporations (Katz and Allen, 1983; Hussinger and Wastyn, 2015). The three approaches in our case studies have top management's support, as the initiatives are part of an overall strategy to transform the company. In each case, the head of the new organization for corporate-startup collaboration has direct contact with the firm's CEO, and a direct reporting line exists to the top level. The importance of top-management support has been underscored by almost all change theories and practitioners (e.g. Kotter, 1996; Nadler and Tushman, 1997), and also has been emphasized by scholars studying corporate transformations (Tushman and O'Reilly, 1997; Birkinshaw *et al.*, 2016). Such top-level management support is clearly visible in all three cases.

Further, all three cases involve internal experts and/or decision makers in their new organizational approach to collaborate with startups. The BioVentureHub involves researchers; Stena Metall New Ventures involves people from R&D, the product lines, and operations; and Electrolux both asks internal decision makers for innovation needs and technical challenges, and act as a match-maker between internal decision makers and selected startups. Starting from perceived needs of internal stakeholders can help to obtain their later buy-in, while focusing the search for external technologies and businesses to link up with (Lichtenthaler and Ernst, 2006).

A dynamic capabilities and IT-Enabled business transformation perspective

The description of and comparison of the three cases will now be used and viewed from, first a dynamic capabilities focus, and then from a "level of business transformation" focus.

A dynamic capabilities perspective. The large firm's ability to sustain competitive advantage at the enterprise level is by Teece (2006) distilled down to the firm's dynamic capabilities (sensing, seizing, and re-configuring assets and resources). Dynamic capabilities in turn do play a role in a firm's business transformation (Ghosh *et al.*, 2017). All three cases use external startups as a source for new innovations, but do the collaboration initiatives lead to higher dynamic capabilities, necessary for any transformation of a firm?

The focus on, and use of external startups could increase the firms' sensing capabilities, specifically in the case of Electrolux in which traditional scouting and a broker model are used

to scan the market and in that way reach a higher reach and share of different global entrepreneurial ecosystems (Zheng *et al.*, 2011). However, not only the reach matters but also the company's innovation focus. Electrolux's focus on innovations close to core business could limit the effect on the firm's sensing capabilities as the search is focused on new assets and resources close to what Electrolux does today. As the innovation focus should be a more powerful force than a potential broader access to startups, it can be assumed that Electrolux's sensing capabilities are limited. The BioVentureHub's and Stena Metall New Ventures' primarily use of own resources for searching, often local startups could lead to a limited sensing capability, specifically as none of the two companies seem to use any online platform to search and interpret new solutions generated by startups. In the case of Stena Metall New Ventures, the fact that they work with three horizons; today, 2–4 years and 4–8 years, could affect their sensing capabilities positively as they are expected to search for new technology and business models important in 2–4 years from now and also continuously sensing what can be evolving in 4–8 years time. Also, the BioVentureHub's focus on non-core innovations could positively affect the firm's sensing capabilities by forcing the new organization to "look around the corners" and into new areas. In the case the BioVentureHub would start to use a broker model, similar to the one Electrolux use, their sensing capabilities could however further increase. Further, in the case the initial approach is complemented with new approaches, such as in the case of Electrolux and its innovation factory, the firm's sensing capabilities could be positively affected.

The three cases have all introduced practices in order to increase the firm's seizing capabilities. One example of this is the BioVentureHub's and Stena Metall's structural separation of the new organization from the firm's core business. This could increase the probability for the firm to seize, that is mobilize resources (ownership and/or knowledge transfer, etc.) and develop strategic alternatives in new areas of interest for the larger firm. Here, an own fund and access to capital, which is the case for Stena Metall, could be a benefit in moving faster and seize opportunities (e.g. get access to IPRs and key competences). In the case of Electrolux, the open innovation function seizes opportunities that are in line with internal stakeholders' 'identified challenges/opportunities', which could be assumed to be innovations rather close to current businesses. However, their new initiative, the innovation factory, could lead to increased seizing capabilities.

Finally, the fact that Electrolux, Stena Metall New Ventures and the BioVentureHub, involve key stakeholders such as key decision makers within the firms, and expose these to the new solutions and companies, should affect the firms' re-configuring capabilities positively as the involvement of key resources from within supports the building of a capacity to absorb new innovations (Lichtenthaler and Lichtenthaler 2009; Hill and Birkinshaw, 2014). Another factor that should positively affect both Stena Metall's and Electrolux's re-configuring capabilities is the fact that both companies are searching for innovations directly or semi-directly important for current businesses, which could be expected to lead to less resistance to absorb the new innovation). In the case of AstraZeneca, it could, for the same reason, be expected to be harder to re-configure non-core innovations, as most firms, specifically public companies, are measured and evaluated on a quarterly basis. However, the firm's evolution towards a search for more matured small companies with proven business models, can be a step in their learning curve to increase the likelihood of re-configuring AstraZeneca's assets and resources. Finally, the top management support and the new organization's explicit role for the firms' business transformation should strengthen all three companies' re-configuring capabilities (Tushman and O'Reilly, 1997; Birkinshaw *et al.*, 2016).

Level of IT-Enabled business transformation. AstraZeneca's BioVentureHub has already had impact on the firm's transformation by the implementation of a new pre-clinical test method, developed by one of the startups co-located in the Hub. Further, AstraZeneca has

initiated three digital cooperation projects with another firm co-located in the BioVentureHub. Through Stena Metall New Ventures initiative, the firm has got access to a number of new solutions for more efficient recycling, based on innovations from startups. Some consequences from this exposure to new startups are the investments in BioImpakt AB (experts on biological analyses) and the Halosep process (the process purifies ash from incineration plants, such as Flue Gas Waste, recycling it into new raw materials such as salt and metals), as well as the actual launch of Repur AB (recyclable material for insolation). Finally, in the case of Electrolux and its Open Innovation function, they have now developed further knowledge on what digital technology areas are of strategic importance for the company in the near future (1–5 years). As a next step the company has identified five focus areas and conducts sensing and seizing activities in those five technology areas. Currently, Electrolux collaborates with several startups within these areas in order to support the future transformation of the company.

In addition to these effects, all three firms evolve in their learning of how to work efficiently with startups as a source for technological innovations, as well as increasing their overall knowledge of new emerging technology areas and ecosystems created around these new technologies.

If the above cases, as a third step are analyzed according to the "Five levels of IT-Enabled Business Transformation" framework introduced by Venkatraman (1994), some interesting findings are made. In the case of AstraZeneca the firm has both implemented an organizational innovation in the form of a new pre-clinical test method and has initiated several digital cooperation projects with startups in the Hub. In the case of the pre-clinical test method, this should involve more than one function in the firm, why the level of business transformation could be viewed as "internal integration", in the words of Venkatraman (1994). Regarding the digital cooperation projects they might still be "localized exploitations," but could also affect the overall business process ("Internal integration") or even aim to change the business process ("Business Process Redesign"), and/or connect the firm with external partners through a "Business network Redesign". The future development of these projects will show the final level of business transformation.

In regards to Stena Metall New Ventures, the launch of Repur AB and the investment in the Halosep process, indicate that they have reached a level of "Business Process Redesign." However, their investment in BioImpakt AB could also indicate that they might aim for "Business Scope Redefinition" by entering the business for biological analyses of the environment before things are re-cycled. Finally, the case of Electrolux is harder to position in the framework for IT-enabled business transformation. Most of the innovations they have sensed, seized, and integrated could be assumed to be "localized exploitation," that is having a local effect on the firm's transformation. Also in this case, future research on the company can tell if this will be the case or not.

Conclusions and implications

The analysis of the three cases in three steps, first according to their model's approach, evolution, and integration, second according to their dynamic capabilities (sensing, seizing, re-configuring) and third according to the degree of, and benefits from IT-enabled business transformation, was a valuable path to better understand the different cases' effect on respective firm's business transformation.

An important conclusion from the above analysis and discussion is that startup collaboration did support in all three large firms' development of dynamic capabilities, specifically in regards to sensing and seizing new business opportunities. In regards to re-configuring or transforming assets and resources as an effect of sensing and seizing new opportunities, the three firms had organizational practices that would make a re-configuring of

assets and resources possible. However, the new organizations' separation from main business and the direction of the search for innovations should mean a re-configuration on different levels of business transformation. For example, Electrolux's Open Innovation function could be expected to generate more of "localized exploitations," and Stena Metall New Ventures could be expected to generate some "business scope redefinitions." One way firms could manage the risk of only achieving "localized exploitation" of new technologies, is by consciously and deliberately using startup collaboration for different purposes, from "localized exploitation" to "business scope redefinition." This in turn would create a need for a portfolio of corporate-startup collaboration initiatives, which all of them might require different set ups, e.g. a more separated approach with strong direct link to the CEO for "business scope redefinition" and a less separated, more local (link to the local manager) approach for "localized exploitation." Interestingly, all three companies are currently evolving their initial approach with new, complementing ones, which do have a different focus and therefore potentially enhanced end result. Further, also a single approach can shift in focus over time and therefore produce different outcomes in a firm's transformation. An interesting case on this is Disney Accelerator that started out being highly separated and focused on external startups with a potential of providing future business opportunities for Disney, but now is increasingly integrated with the company's core businesses and also invites internal idea providers, in order to generate faster positive financial effects (Steiber, 2019).

Finally, independent of degree of business transformation, all the large firms have through their collaboration with startups started to develop their own emerging digital ecosystems, Stena Metall and Electrolux in pre-decided sectors, and AstraZeneca in more of a serendipitous way. Further, by applying a learning approach, all three companies learn fast and have built relationships with interesting tech startups while propagating new practices internally, thus enhancing their ability to sense, seize, and transform. However, integrating new solutions, even if they are close to core business, is still a challenge for all three companies, either due to the common Not Invented Here syndrome, or due to the fact that the innovation is too far from what is done today.

A number of managerial implications can be drawn from this paper. First, large-firm collaboration with startups definitely seems like an interesting strategic avenue for developing increased dynamic capabilities. However, the set-up of the new approach does affect those dynamic capabilities, as well as the type of entrepreneurial opportunity (incremental or innovative), and therefore the end result in a firm's business transformation. Therefore, the company needs reflect upon the purpose and end goal with each startup collaboration initiative and also upon the potential benefit from developing a portfolio of different initiatives.

Future research

There exists a deep knowledge gap on how startup collaboration models affect larger firms' business transformations, as well as how to measure these effects (Steiber and Alänge, 2013b). More research is needed in this field, both in regards to more case studies, but also on an analytical framework or process, to better analyze corporate-startup collaborations' effect on large firms' business transformation. A further refinement of the analytical process used in this paper could be of large theoretical value.

Further, it would be of interest to sort and rank different startup collaboration models according to their applicability and outcome on the large firm's digital transformation. Finally, there is also a need for research both on how startups experience each type of corporate-startup collaboration and on their ultimate purpose and effects viewed from the large firm's perspective. Is it perceived to be a true benefit for the startups, what are the risks for the startups, and how could both benefits and risks been measured?

It is reasonable to expect that there will be a growing need for research in all these areas. Digital transformation is not something large firms can accomplish once and be done with, as digital technologies keep evolving and growing more sophisticated. Therefore, the imperative is to become ever more adept at *ongoing* transformation – and as large firms reach out to startups for assistance with this, they will need increasingly refined insights into how to do it well and for different end goals. We hope that the research presented in this paper can serve as a useful starting point.

Notes

1. Co-creation is a management initiative, or form of economic strategy, that brings different parties together (for instance, a company and a group of customers), in order to jointly produce a mutually valued outcome (Normann and Ramirez, 1993; Wikström, 1996; Prahalad and Ramaswamy, 2004).
2. Business co-location is the placement of several entities in a single location.
3. Stena was founded in 1939 by Sten A. Olsson and is owned by the Olsson family.
4. More information about Electrolux and its Open Innovation function is found in Alänge and Steiber (2018).

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