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A process-based model of network capability development by a start-up firm

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ABSTRACT

Start-up firms are notoriously resource and time poor. One way of addressing these deficits is to develop strategic capability to access, activate and co-shape resources with other firms in the start-up's network. The capability literature assumes such a development is inevitable, provided a start-up survives. But developing network capability depends on the managers of other firms, the deepening managerial understanding of business relationships, and the ability of the start-up managers to adjust to and understand interdependence in networks. We present a processual model of how managerial understanding of network capability develops, comprising of three parts each building on the earlier: (i) in relationships, (ii) through relationships and (iii) in the network. The model was inductively developed from a longitudinal study of a start-up firm. Also, two sensemaking processes were found to predominate – problem solving and social-cognitive processes. Our model highlights the role of the start-up manager in sensemaking with managers across a number of firms to resolve commercial problems. Thus, the independence many start-up managers seek must turn towards interdependence. Second, managers' temporal horizons and the specific temporal profile of events and activities inside the involved business relationships are important in understanding and developing, with other firms, network capability.

1. Introduction

Born with the liabilities associated with being small and new, start-ups have limited development and growth options. One path is through external resource access by joining business networks. Some start-up managers know well from past ventures how to apply business relationships in networks, while for others an intuitive understanding is found from within their set of social and economic relationships (Dodd & Anderson, 2007). That business relationships and network embeddedness for a start-up will change over time is not new (Coviello, 2006; Greve & Salaff, 2003; Hoang & Yi, 2015; Lechner, Dowling, & Welpe, 2006). However, our inductive study brings to the literature an understanding of strategic network capability, which is how managers jointly with partners build the capability to access, activate and co-shape resources with other firms so as to develop and/or change a network. Our study also contributes to an understanding of how managers make sense of and shape business relationships so as to access resources to support their start-up business.

There appears in the literature an underlying assumption that network capability is naturally endowed on firms (Eisenhardt & Martin, 2000). However, network capability is developmental in nature rather than inherent (Möller & Svahn, 2003), as firms must internally build capabilities (Teece, Pisano, & Shuen, 1997). We argue that an important part of developing network capability is the evolving managerial understanding of the potential of business relationships and networks. We also argue, as do Thornton, Henneberg, and Naudé (2014), that a firm's network oriented behavior matters in business relationships (Thornton, Henneberg, & Naudé, 2015); but we would go further in that the managers of other firms must play a part. Developing network capability calls for sensing and *acting with* other firms, and so is more than an internal proficiency of a firm at orientating towards other firms. That other firms are involved also means enacting a network capability is a somewhat unique process for each context.

Most start-up firms begin outside of a core business network. The managers will need to discover which relationships provide the critical connections for success. Also the inherent lack of reputation and legitimacy of a start-up means that time is needed for other firms to recognize a new player. Network capability has been long associated with start-up firm performance (Zacca, Dayan, & Ahrens, 2015), yet we know surprisingly little about how managers develop this proficiency (Gulati, 1998; Kale, Dyer, & Singh, 2002). Autio, George, and Alexy (2011) and Zahra, Sapienza, and Davidsson (2006) comment on the dearth of empirical studies on start-up capability development in general. The aim of our paper is to study, in a temporally sensitive manner,

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our research question: how is an understanding of network capability developed and changed over time by the managers of a start-up firm?

To fill this research gap, we contribute to the literature by presenting a model of how an understanding of network capability develops. The model relies on a temporal lens, whereby we place "time and timing front and centre" (Ancona, Goodman, Lawrence, & Tushman, 2001: 645). Taking a temporal focus responds to calls for elaborating dynamics in industrial marketing (Andersson & Mattsson, 2010b; Hedaa & Törnroos, 2002, 2008) and in economic sociology (Granovetter, 1992), but in any case accounting for time is a part of understanding an interactive development process (Halinen, Medlin, & Törnroos, 2012). We follow Pettigrew (1997: 338), who defined process as "a sequence of individual and collective events, actions, and activities unfolding over time in a context." The temporal mapping of events and activities provides an understanding of a specific pattern of development (Aaboen, Dubois, & Lind, 2012; Ancona, Okhuysen, & Perlow, 2001; Gersick, 1994) and also involves grasping a shifting context (Andersen & Medlin, 2016; Medlin & Törnroos, 2015). Thus, an inductive case study following a process of development longitudinally (Yin, 2010) is a relevant and possibly the only way to study how an understanding of network capability is developed.

A temporal focus is achieved by studying a start-up firm, which is continuously changing, inside a network context which is also shifting. Two key aspects of time were evident in our analysis and formed the basis of our inductive approach to developing a model for managerial understanding of start-up network capability development: (A) managerial sensemaking processes, and (B) periods of development. In the study, we observed strongly two sensemaking processes: a) problem solving, and b) social-cognitive processes leading to comprehension and a deepening understanding; and three periods of development: (i) in relationships, (ii) through relationships, and (iii) in the network. This classification provides an understanding, based on our case study firm, of a start-up firm's development as the managers deepen their understanding about how to adapt business relationships and eventually achieve network capability.

Empirical studies focusing on network capability development for a start-up firm are rare. The study by Aaboen, Dubois, and Lind (2013) which focuses on networking as a strategy is an example, but in that research network capability was assumed to naturally arise. Thus, the focus on how managers develop network capability is not addressed. In contrast we do not assume a natural process by which start-up managers will necessarily develop their network capability. However, we accept Eisenhardt and Martin's (2000) point that once a capability is apparent one might look back and inductively theorize a development process. The gap in the literature, of how start-up managers understand and develop network capability in interaction with other firms, is salient. Start-ups differ in many important ways from established firms, as they need to develop their relationships with other businesses to gain legitimacy, survive and grow. Our development model, if understood by the owner-manager(s) of a start-up, may speed the temporal pacing of developing network capability.

The paper is structured in the following manner. First, we highlight network capability as an interaction concept, one that only exists in a world view of substantive interactions. This notion of capability being focused between firms and enacted through interactions, presents a time sensitive research issue (Medlin, 2004). Second, we outline our method. Our theoretical lens means we are able to see the network surrounding the start-up firm and so our inductive approach is already theory laden (Heath & Cowley, 2004). Thus, we acknowledge that while our approach is inductive, there is always an abductive aspect (Dubois & Gadde, 2002). Third, to study the phenomenon of developing network capability we elaborate a processual method, which can capture the temporal development. Fourth, we present and analyse a longitudinal case study to explore the temporal development of network capability. Fifth, we present and discuss our model of network capability development by managers of a start-up. In our conclusion we discuss managerial and research implications.

2. Literature

The initial place of a start-up outside the business network presents an issue for how managers develop network capability. In an interaction setting network capability relies on two perspectives. The capability aspect is rooted in a resource based view of the firm (Eisenhardt & Martin, 2000). The resources, including the manager's understanding, are within the firm. By contrast a network perspective views the firm as one among many, and so activities and resources are spread between the firms and across the network, and the firm does not act alone (Håkansson & Snehota, 1989). Rather managers in business relationships support and coordinate how activities and resources are applied across multiple firms (Anderson, Håkansson, & Johanson, 1994). In this approach "capabilities are more properly regarded as characteristics of relationships rather than of the actors" (Ford & Håkansson, 2006a: 15). Within this literature, the development of network capability by managers of a start-up emerges as the firm deepens its mutual commitment in dyadic relationships (Håkansson & Snehota, 1995). Purposeful repositioning, which is a certain sign of network capability, necessarily requires the joined action of other firms. Thus, for start-ups, developing network capability will take time.

The literature on network capability has extended from a resource based view (Barney, 1986; Wernerfelt, 1984) to include external capability creation (Dyer & Singh, 1998; Lorenzoni & Lipparini, 1999; Powell, Koput, & Smith-Doerr, 1996). Within the network perspective the external focus is on managing business relationships (Ritter, 1999 see Figure 4, page 476). Ritter, Wilkinson, and Johnston (2002) further elaborate the external focus by adding a portfolio of relationships and so a network managing capability is addressed, as one sub-dimension of network competence. But for start-ups there are a number of hurdles in developing network capability, because relationships and position in the network also rely on other actors (McGrath & O'Toole, 2013).

There are two issues which are uncertain in the current understanding of network capability when other connected firms are also considered. The first is the nature of the managerial understanding which links processes to the network of firms. In the early years of a start-up's development sense is made of the context through the eyes of the entrepreneur(s) and the knowledge of the manager is the basis of dynamic capabilities (Teece, 2012). From a micro-foundation perspective, Helfat and Peteraf (2015) argue that managerial cognitive abilities underlie dynamic capabilities for sensing, seizing and reconfiguring resources. Sensemaking by managers (Weick, 1979; Weick, Sutcliffe, & Obstfeld, 2005), according to Kavanagh and Kelly (2002), is conceptually well suited to understanding multi and across level analytical situations. Thus, we suggest that sensemaking provides bases by which managers can ground the formation and existence of network capability.

The second issue is how to elaborate a start-up's position within the already surrounding network as a progression is made towards embeddedness in what is a changing network. Understanding how network capability develops requires also seeing and making sense of how business relationships and the network are connected and changing over time (Medlin & Törnroos, 2015). However, studying business networks as an analysis between levels (see Ford & Mouzas, 2013) misses the focus on the processes enacted by managers and the managers' understanding of those processes. Ford and Mouzas (2013: 438) comment that "All actors network: all try to affect their position within single relationships and within their small world. … All networking has its effects within relationships." But this actor and outwards centric view does not indicate how and in what ways a specific business relationship might be important. Rather relationships are considered important in every direction across the theoretical matrix presented by Ford and Mouzas (2013).

Thornton, Henneberg, and Naudé (2013), address how a specific

business relationship is a means to influence indirectly connected firms, and so strategize on the basis of a network position. In their study relationship behaviors are found to be focused on information acquisition, enabling opportunities and mobilizing resources through relationships in different ways. Their network study does not address the way managers have come to *understand* utilizing relationships to influence other firms. Further, the role of the other party, and the mutual sensing and interacting of the parties is not researched directly, and thus the path of how network capability is developed is obscured.

Research in the entrepreneurial literature has noted the importance of understanding firm and relationship development processes over time (Larson, 1992; Slotte-Kock & Coviello, 2010). Prior research in the network field considers time as a period for strengthening business relationships and increasing cooperation (Ford, Gadde, Håkansson, & Snehota, 2003); as a period enabling change (Tidström & Hagberg-Andersson, 2012); or as a way of capturing temporal orientations, that is, the length of time horizons in either a forward and/or back view (Andersson & Mattsson, 2010b; Sztompka, 1994). To date network capability has been conceptualized in an environment composed as a relatively stable but changing firm network (Grant, 1996; Mitrega, Forkmann, Ramos, & Henneberg, 2012; Möller & Svahn, 2003). In contrast, authors taking a systems view of capabilities (Eisenhardt & Martin, 2000; Teece, 2007; Teece et al., 1997) presume a punctuated-equilibrium temporal context (Gersick, 1991, 1994). An alternate conceptualization, which sidesteps the stability/change temporal notion (Andersen & Medlin, 2016) and also punctuated equilibriums, is that of the dynamic network where the relations between firms are constantly shifting (Medlin & Törnroos, 2015). Without boundaries networks are always in imbalance (Håkansson & Johanson, 1993). But also interactions are always forward focused (Medlin, 2004) in asymmetric time flow (Adam, 2000). Such a conceptualization of a dynamic background can allow a study of how an understanding of network capability develops when other firms are involved. In addition, a dynamic network background allows for situations in which network change is so profound as to lead to a reversion in the firm's network capability, although not necessarily in a manager's understanding.

We argue that in a dynamic network perspective, the development of an understanding by managers of how to re-position with managers of other firms becomes a more open question. Here many issues arise, because not only is the start-up firm changing in nature as business relationships develop, change and fade, so too are the connected firms, their relationships and the end markets. What we seek to understand is the managers' comprehension of how network capability develops over time when all entities are in flux.

Open is the question of whether a start-up manager comprehends the means by which business relationships enable access to resources. Every manager has a different understanding of a business network, something that is clear from the research of network pictures (Henneberg, Mouzas, & Naudé, 2006; Kragh & Andersen, 2009). But network pictures are rather static. We are interested in how a start-up manager understands the ways in which business relationships aid in re-positioning within a network. Or, do start-up managers intuitively see developing business relationship as a means to position themselves within a network? In each of these scenarios managers' understandings of business relationships are associated with networked contexts, but the understandings and processes linking these conceptualizations are unclear. Further, network capability by managers of a start-up will develop inside the interactions with other firms and so the pace of development is likely uneven. An effective way to explore these issues is to use an inductive case study.

3. Method

A start-up was chosen for the inductive case study because by definition the firm begins outside of the network and the managers usually have limited network knowledge. Start-up firms are often noted to be driven by owners with a strong internal locus of control (Mueller & Thomas, 2001), and so these managers prefer independence rather than network interdependence. Further, they are usually associated with a 'survival mentality' and 'firefighting' in their day-to-day activities (O'Donnell, 2004). On the other hand a rich literature suggests that start-up firms benefit through interaction in business networks (Hoang & Antoncic, 2003; Semrau & Werner, 2014). This contradictory nature, of 'in the moment surviving' while also needing to develop a longer-term network position means that an entrepreneurial firm is well suited to study how a start-up manager develops an understanding of network capability.

The focus on a start-up firm also resolves a methodological issue, because the firm and the individual manager in our case are effectively the same (Teece, 2012; Vohora, Wright, & Lockett, 2004). Thus, the activities of the firm within the surrounding network are organized and evident in the sensemaking by our informant manager and in conjunction with his reporting of the actions of other firms.

We adopt a processual (Pettigrew, 1997) and inductive (Gioia, Corley, & Hamilton, 2013) method, which allows for gaining insights and also an understanding of the emerging internal-external dynamics of start-up network capability development. The study is constructivist in nature (Järvensivu & Törnroos, 2010) and so conforms with managerial sensemaking processes. Consistent with a processual network study, time is conceptualized as flowing (Halinen et al., 2012), asymmetrically forward (Adam, 2000) and available to researchers as periods (Medlin & Törnroos, 2015).

3.1. Case study and data collection

The case firm, Wireless Antennas (WA), was founded in January 2005. The founders' intention was to provide unique wireless antennae solutions (i.e. wi-fi) for different types of applications. The two European founders met at a 2003 trade fair in Taiwan and for both partners this was their first business. Each had diverse skills which facilitated the partnership; one had spent 8 years working in Taiwan, was fluent in Mandarin and had a significant knowledge of electronics manufacturing and design. This partner became the technical director of the company. WA's embeddedness within the Taiwanese electronics industry grew apace with their sales growth. The developing technical and sales networks are related, but studying network capability development is achievable by looking only within the sales side.

The second partner, the sales director, had selling experience and was responsible for all customer initiation and relationship management. The business was launched in January 2005 and by August they had eight customers. WA began making a profit in 2007 and by 2015 they had worldwide operations.

The owners agreed to participate in this study in 2007. Table 1 displays the data set, which was gathered through a variety of primary and secondary sources.

3.2. Data analysis

The case study was prepared by the researchers according to a process perspective. Activities and actions are noted by events, which trigger an individual and/or a social interpretation (Bizzi & Langley, 2012; Pettigrew, 1997). Business process research deals with how events and activities come into being through the sensemaking of managers and unfold over time in a context (Halinen et al., 2012). Activity and actions in a process are socially understood, and so there are always in view the other parties. A strength of process research is the opportunity to understand how things develop and why they change over time (Langley, 1999). Using a process perspective is appropriate in studying how start-up managers develop their understanding of network capability because events and activities can be mapped temporally and relative to the changing network.

The way researchers capture processes as reality in flight (Pettigrew,

Table 1
Data sources.

Individual	Data source	Date
Both directors	Secondary data (application for university start-up programme)	2005 (from records)
Both directors	Secondary data (business plan)	2006 (from records)
Both directors	Secondary data (business plan)	2007 (from records)
Sales director	Interview	11 September 2007
Sales director	Secondary data (application for employment subsistence from government body)	26 October 2007
Sales director	Interview	26 October 2007
Sales director	Facilitated meeting with other start-ups	29 November 2007
Sales director	Facilitated meeting with other start-ups	7 December 2007
Sales director	Interview	18 January 2008
Sales director	Facilitated meeting with other start-ups	24 January 2008
Both directors	Secondary data (business plan)	19 February 2008
Sales director	Facilitated meeting with other start-ups	20 February 2008
Sales director	Interview	28 February 2008
Sales director	Facilitated meeting with other start-ups	27 March 2008
Sales director	Facilitated meeting with other start-ups	24 April 2008
Sales director	Interview	24 June 2008
WA company	Ongoing secondary data collection (newspaper articles and case studies provided by the company in addition to website information). 500 pages of information	January 2009–October 2015
Sales director	Questions and answers via e-mail	12 September 2011
Sales director	Interview	5 February 2013
Sales director	Questions and answers via e-mail and social media	7 October 2015

1997) requires tuning in to informants and how they understand events and activities in their context (Lincoln & Guba, 1985). In this study, the researchers' interpretation of the transcribed interviews and documentation is analyzed according to how the informant relates the events and activities as part of an ongoing story (Lincoln & Guba, 1985). Over the twelve year study, we isolated events, actions and activities from within interviews, discussions and supplementary documentation and arranged them chronologically to compile an historical mapping (Halinen et al., 2012). We selected the thirty four most significant events and the associated actions/activities that evidenced change in the relationships and the network and in the informants understanding of network capability development. In the event tables, which follow, the selected activities are indicated as E^1–E^{34} and commented on. Additionally, given our focus on the temporal nature of developing an understanding of network capability, markers of how the informants saw the firm's activities as short-term (T^S) or long-term (T^L) relative to the surrounding network are presented in Tables 2–5 and Fig. 1.

Analyzing events and activities as elements of interactions can provide an understanding of the various changes that take place within relationships and networks (Schurr, Hedaa, & Geersbro, 2008). Analysis of transcriptions and the reduced narratives (Makkonen, Aarikka-Stenroos, & Olkkonen, 2012), along with a theoretical context, provided meanings and understandings within the research process (Lincoln & Guba, 1985). In analyzing the tables, we looked for patterns through constantly comparing grouped data (Corbin & Strauss, 1990). Further, the temporal and sequenced connection between events and activities provides a contextualized longitudinal 'story' of processes framed through the informant's sensemaking and then given a theoretical meaning by the researchers (Weick, 1989). Together, the longitudinal mapping, narrative and changing context allowed us to sense inductively a temporal progression of network capability development.

Our analysis highlighted three types of business problems, which were imperatives to the informant. These business problems remained consistent throughout the years: a) Sales/Finance, b) New Product Development (NPD), and c) Core Business Relationships (CBR). The changes in the way our main informant managed activities to resolve these problems gave the first indication that the strategic approach differed over periods. Next we looked for examples of events and activities where the informant solved a problem without applying either a relationship or a network frame for their set of activities, and later a problem resolved by actions and activities which required a relationship or a network. These different solutions to the three problems were described by the informant over time in completely different terms. The analysis and the distinctions are presented within our findings section.

Also strongly apparent in the data were two sensemaking processes applied by the managers and repeated throughout the 12 year study: a) problem solving and b) social-cognitive processes leading to changes in understanding. Identifying these managerial processes gave the researchers further understanding of the event mapping tables, and apparent was a change in the informant's focus; implied by the increasing complexity of the solution, and evident in the activity sequence of the case story, was a deeper and more intricate understanding within the social-cognitive and the problem solving processes. The understanding of relationships changed qualitatively, as a new framework was applied. Three different approaches to relationships and network were found in a sequence of periods: managing (i) in relationships, (ii) through relationships, and (iii) in the network.

4. Findings

In this section we present the case study organized around the three periods of the managers' understanding of network capability development. Tables 2–4 outline the events chronologically in each period and these are mapped to the sensemaking processes at play in network capability development. Table 5 documents an achievement of network capability.

Table 2
In relationships period.

Date	Business problems	Event/activity		Temporal horizon	Problem solving/socio-cognitive processes
Nov 2004	Sales/NPD	E^1	Commenced a project for a Japanese Tier 1 supplier which became their first sale.	T^S	Driven by problem solving and not making sense of the resource access. Transactional and independent problem solving.
Aug 2005	Sales	E^2	At this point they had 8 customers, and were targeting a further 10.	T^S	
Sept 2005	Core business Relationship (CBR)/ finance	E^3	Joined a university run spin-out programme of 1 year duration and received a competitive state financed employment grant.	T^S	
Aug 2005	Finance	E^4	Two small investors.	T^S	
March 2006	NPD/CBR	E^5	Developed a connection with a university radio antenna research centre.	T^L	Move towards understanding the relational advantages associated with building reputation and legitimacy and customer retention. Signs of adaptations from the other party, but no physical resources were combined.
End 2006	CBR	E^6	Becoming more focused on customer retention.	T^L	

Key: E^1–E^6 = critical events 1 to 6. T^s = short term horizon. T^L = long-term horizon.

Table 3
Through relationships period.

Date	Business problems	Event/activity		Temporal horizon	Problem solving/socio-cognitive processes
Dec 2006	CBR	E^{7}	Mentor from the spin-out programme provides important contact, and enterprise agencies involved in spin-out programme provide European sales contact which translates into major sale.	T^{S}	Connected through relationship but didn't realize their importance or significance.
Jan/May 2007	Finance	E^{8}	Unsuccessful in State funding application but attained bank finance due to winning a business plan competition.	T^{S}	
May 2007	CBR/NPD	E^{9}	Collaborative problem solving.	T^{S}	Problem solving without future intent.
June 2007	CBR	E^{10}	Appointed two engineers in the US to work on-site with US customers tuning and customizing antennas. Both are paid on a job-by-job basis.	T^{L}	Developing competencies.
October 2007	CBR	E^{11}	Begins to get referrals to major clients through existing customers. Decided to focus on two main product ranges.	T^{L}	Problem solving with future intent. Realize the value of using their reputation for future sales.
Dec 2007	CBR/NPD	E^{12}	Value co-creation with customers.	T^{L}	Joint problem solving.
Feb 2008	CBR	E^{13}	Distributor visits to the UK to jointly engage with new and current customers every six months. Annual review with business partner.	T^{L}	Realizing the value of maintaining core business relationships to influence and access resources in other relationships.

Key: E^{7}–E^{13} = critical events 7 to 13. T^{s} = short term horizon. T^{L} = long-term horizon.

4.1. Period one: in relationships

The development of an "in relationship" understanding as a means to access resources is documented in Table 2 for the period November 2005 to December 2006. Table 2 chronicles how customer generation was based on the need to generate sales and so keep the business afloat. Time horizons were generally short, until the end of the period.

In the beginning the sales director had no understanding of 'in relationships'. In this early period each sale was viewed as a transaction, deemed complete at the end of the sale. The sales imperative was linked to doubling the business size every year. Apparent was the lack of interest in building relationships to support ongoing sales. Indeed both founders believed their product life-cycle was very short with a maximum of two years before new technologies would usurp their place in the market. One can say that the founders had no, or little, understanding of their immediate network, and rather they saw only the potential customers coming into view as they searched the market via cold calls for new sales leads. Customer interactions were not further developed and unless an actor was of immediate use the relationship quickly became dormant.

In this initial period, the managers of WA were driven by technical problem solving, as their knowledge and skills meant they could achieve high wi-fi antenna performance with low noise. WA's technical base in Taiwan, and later China, meant they were competitive on costs and they could deliver quickly. To win contracts WA would independently, without charge, undertake custom design projects for a targeted customer. A solution was proven with a single customer and a one-off supply contract followed.

In September 2005, WA was invited to join a university spin-out program after being deemed a business start-up with export potential. This program provided a salary subsidy and access to an appointed mentor who had experience in WA's industry sector. The mentor: "*Helped us with direction, not specific projects. He provided us with a good insight into other companies on the market and how we were making ourselves look to larger automotive companies*" (Sales director, WA, interview 11 September 2007).

In the beginning of 2006 WA connected with a university radio antenna research center. This relationship was thought to provide access to new knowledge, but the antennas were designed for large scale applications. However, the sales manager realized that the connection added to WA's reputation and provided them with enhanced legitimacy to aid financing: "*from an investor point of view it is handy to have a connection with them*" (Sales director, WA, interview 26 October 2007).

During 2006 WA had a financial objective to bring in investment, including equity of €500,000, to fund an in-house engineering team and product development facility. The founders identified a range of investors, including distributors, and as they feared losing control of their operations they also approached a government agency for investment funds. These goals were not met despite considerable efforts.

Towards the end of this period the managers of WA started to sense the importance of relationships as two way interactions. The relationship with the university radio antenna research unit failed, but the possibilities are noted. On the other hand with customers, the sales director understands the need to respond quickly and precisely not only to gain, but also to retain, customers. The customer is seen as more than a transaction. Customers were sensed to be adding possibilities. One customer asked WA for assistance in introducing their final product to Taiwan and another sought help in outsourcing manufacturing. However, the temporal horizon of WA's manager remains short (in Table 2, T^{s} predominates against the events $E^{1–6}$).

4.2. Period two: through relationships

This period commenced with a major sale brokered through a mentor and an enterprise agency. However, at this point the managers did not understand or appreciate that a relationship was central to

Table 4
In the network period.

Date	Business problems	Event/activity		Temporal horizon	Problem solving/socio-cognitive processes
2009	CBR	E^{14}	Set-up operations in the USA to more closely engage with US based customers.	T^{L}	Problem solving, to engage with expanding US customer base and develop more products.
June/Oct 2009	Sales/NPD	E^{15}	Multiple independent new product launches.	T^{S}	
Nov 2010	Sales/NPD/CBR	E^{16}	Value co-creation with customers.	T^{L}	
Jan 2011	Sales/CBR	E^{17}	New major distributor agreement.	T^{S} T^{L}	Social-cognitive processes.
June/July 2011	Sales/NPD	E^{18}	Multiple independent new product launches.	T^{S}	Problem Solving.
Dec 2011	Sales/NPD/CBR	E^{19}	Three way collaborative project with future potential.	T^{L}	Social-cognitive process, changes noting future, long-term customer potential.
Dec 2011	CBR	E^{20}	Partnering with major telecommunications company.	T^{L}	Realizing the reputational benefits in associating with partners, yet with no collaborative projects started.
May 2012	Sales/NPD	E^{21}	Multiple independent new product launches.	T^{S}	Problem solving.
August 2012	CBR	E^{22}	Joint award winner.	T^{L}	Enhanced understanding of the benefit of operating in the network.

Key: E^{14}–E^{22} = critical events 14 to 22. T^{s} = short term horizon. T^{L} = long-term horizon.

gaining the sale. This realization came later. The development of a "relationship through relationship" understanding is documented in Table 3 for the period December 2006 to December 2008.

In early 2007 an alternate low cost approach was devised: two engineers were added to their Taiwanese base and tasked to work with part-time project engineers employed in other countries, especially the USA. Employing US engineers on a contract basis "*changed our strategy completely and helped us to develop an understanding of what was necessary for the US market. They … helped us to develop customer and partner relationships*" (Sales director, WA, interview 26 October 2007). The approach provided a new problem solving ability, which was unique in competitive terms and sales began to increase dramatically. The process of problem solving and customizing solutions was repeated with many customers.

The managers at WA began to understand the idea of building new relationships through developed relationships. This was particularly evident in the situation with a French customer in 2007, where the sales manager noted how access to this firm opened doors to other firms. "*I had been trying to organise a meeting with the head engineer in a French firm for the past three years. They use a product similar to ours in their assembly … and I felt that we could be very beneficial to each other. However, due to our 'smallness' this has not been possible. Recently we signed a large company as a client in France. Since then the doors of the other large company have opened and we are to meet in the near future*" (Sales director, WA, interview 18 January 2008).

In mid-2007, WA was a winner in a business plan competition, which enabled them to obtain a bank loan. At this point WA's planning became more long-term and oriented towards growth as opposed to survival.

In early 2008 WA set up a distributor visit program, based on a six month cycle. The purpose was to facilitate and build-up relationships so as to gain referrals. By the end of 2008 WA was beginning to see how important distributor relationships were to their business model, with 50% of customers coming from referrals. The new distributor relationship placed WA directly in touch with customers who then identified problems needing antenna expertise. The founders realized their dependence on the distributors for sales, and unlike their competitors WA paid a percentage, if a referral led to a custom design antenna solution. For WA this turned out to be a good, if unplanned way of gaining loyalty, but more importantly of building a reputation as a technical problem solver, a key evaluative criterion in a sales decision for antennas. WA started to look at distributors as more than simply a logistics service, as was noted: "*The distributors know the lay of the land. They know the local key players, including customers, competitors and suppliers. They keep me informed of changes in the market and introduce me to new customers on each visit*". The sales director saw that meeting customers through distributors or otherwise was vital for WA's business, because "*customers share information in face-to-face meetings that you would never hear through other communication mediums … If you are not meeting them all the time you will really miss out*" (Sales director, WA,

Table 5
Start-up with network capability.

Date	Business problems	Event/activity		Temporal horizon	Problem solving/socio-cognitive processes
Jan 2013	Sales/NPD/CBD	E^{23}	Major collaborative project.	T^{L}	Considered action based on problem solving and developed understandings of network capability.
March 2013	Sales/NPD/CBR	E^{24}	Series of seminars with partners.	T^{L}	
Dec 2013/Feb 2014	Sales/NPD/CBR	E^{25}/E^{26}	Major collaborative projects.	T^{L}	
Dec 2014	Sales/NPD/CBR	E^{27}	Upgraded equipment.	T^{L}	
Feb 2015	Sales/NPD/CBR	E^{28}	New distributor agreement.	T^{S}	
March 2015	Sales/NPD/CBR	E^{29}	Major collaborative project.	T^{L}	
March 2015	Sales/NPD/CBR	E^{30}	Multiple independent new product launches.	T^{L}	
April 2015	Sales/NPD/CBR	E^{31}	Seminars and workshops with major industry players.	T^{L}	
June 2015	Sales/NPD/CBR	E^{32}	Expanding employee base.	T^{L}	
Sept 2015	Sales/NPD/CBR	E^{33}	Establishes a design and support location in Europe.	T^{L}	
Oct 2015	Sales/NPD/CBR	E^{34}	Major collaborative project.	T^{L}	

Key: E^{23}–E^{34} = critical events 23 to 34. T^{s} = short term horizon. T^{L} = long-term horizon.

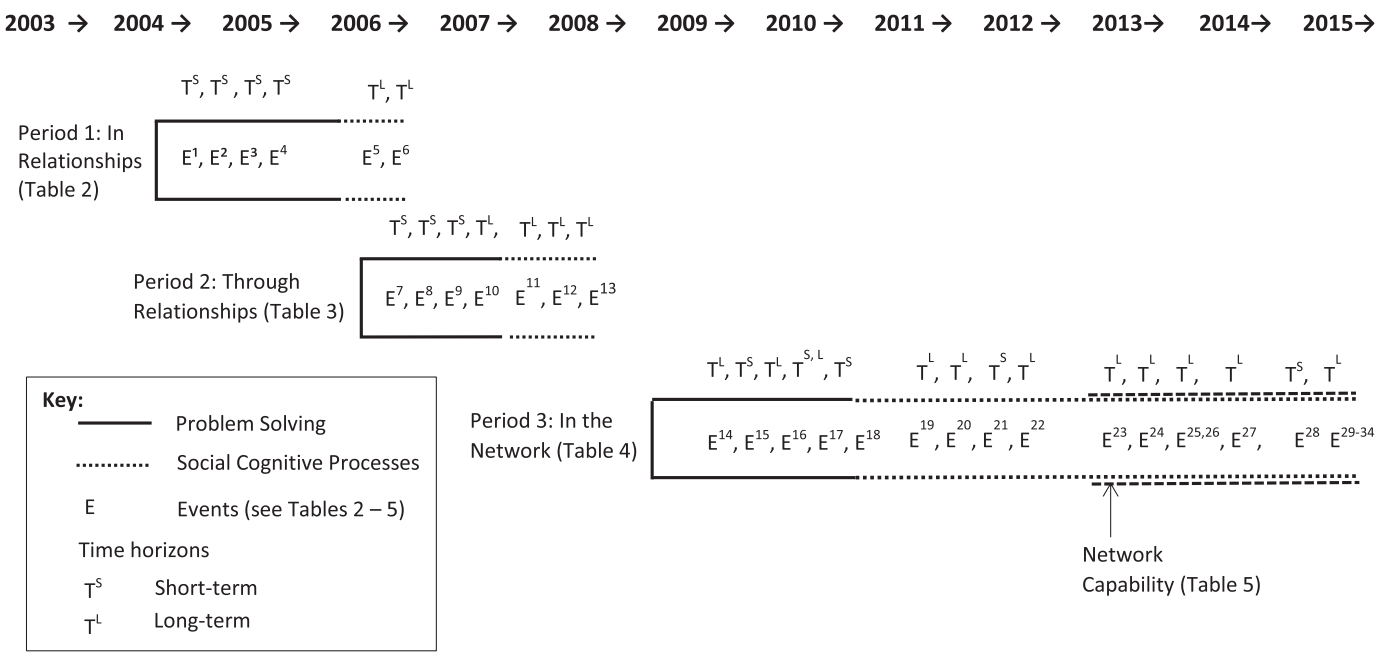

Fig. 1. The temporal pattern of the start-up's network capability and the role of problem solving and social-cognitive processes overlaid with temporal horizons.

interview 28 February 2008).

The idea that a relationship was a conduit into another relationship became apparent to WA, when the full significance of their distributor model on sales was appreciated. That distributors not only brought new sales but did so earlier in the NPD cycle was noted and WA's temporal horizon moved towards a longer term view.

Importantly, the managers could access information held by actors not directly connected. This last element was evidenced in the distributor visits (E^{13}), in which WA was introduced to existing and potential customers. That the managers came to comprehend how they could access information, only after they had set in-train activities with their distributors, shows on the one hand a lack of understanding and then a realization of 'relationships through relationships'. Comprehending this new way to work in and through business relationships was an insight that was now thought about in new ways. Other relationships were looked at with this new understanding and the managers now understood that other unconnected relationships were available through close relationships.

4.3. Period three: in the network

The developing of an "in the network" understanding is documented in Table 4 for the period January 2009 to August 2012.

In 2009 WA opened offices in the USA to more closely support their projects and to increase sales. By engaging with their North American customers, WA's managers quickly developed an understanding of what was needed in that market. WA was learning how to make clear to the customers why they had specific antenna issues in the first instance, and this enhanced their reputation as a specialized problem solver. As a result WA was becoming known in the industry. At this point WA engaged in numerous new product development launches. Core problems being faced by customers included: noise issues, producing smaller sized antennas and most importantly passing certification tests at the first application. The independent product launches facilitated WA's cash flow and growth, allowing investment in technology to test products for in-house certification.

The new reputation of WA was evident when large customers started direct approaches for customized solutions to wireless device problems. Now WA began charging for development work: "*We try to get involved at the start of the design process. Often the customer wouldn't have the expertise to work on a problem, they may be experts in electricity meters or vending machines but wireless design would not be something that they would be experienced in, so we help them with the product design and integrate the wireless element. They pay us for this development activity*" (Sales director, WA, interview 5 February 2013).

In early 2011 WA signed a worldwide agreement with a leading industry distributor. WA's position in the industry was now secure (Sales director, online discussion, 12 September 2011). WA was now a leading supplier, and customers sought to involve them in early product design. "*We don't visit our customers at regular time periods to see if they have problems – all these things are flagged at the design phase as we are involved early. In America that needs product certification, but if they get through that process they would generally never have issues in the field*" (Sales director, WA, interview 5 February 2013). This new strategy meant that interactions with suppliers and distributors were 'lumpy', but on the other hand activities and planning were more strategic and purposeful: "*We always have issues with suppliers and distributors – our meeting are as required now rather than at set times. We have changed suppliers and distributors lots of times. It is usually because they haven't done business as per the terms and conditions that we set out – there has been termination based on that*" (Sales director, WA, interview 5 February 2013).

Throughout 2011–2012 WA continued to also independently launch new products, still not wishing to become over dependent: "*A lot of the products on our website that we produce are relevant to multiple markets/sectors*" (Sales director, online discussion, 12 September 2011). However, in December 2011 WA did partner with two major competing telecommunications companies. This marked a new attitude by WA, as the partnerships were based on collaborative workshops and customer seminars. The founders still had fixed views on remaining independent and controlling WA's activities, but new ideas were coming to the fore as to how the business might grow and succeed through other firms. In part, this change was facilitated by a joint industry award won by WA for new products manufactured collaboratively with a major supplier and a customer.

WA's European plans for 2012 focused on a "*long term commitment to their customer base which is growing and thus requires deeper local support and focus*". The founders of WA now consider relationships as critical to the future: "*We keep on top of changes ourselves but we try and work with partners and carriers as much as we can, to see what is coming down the line*

and find out what they are going to do, what the customers new requirements will be and be ready for it. If you wait for the customer to tell you it is too late. If you tell them you will have it in 6 months you will lose them. They are asking you because they need it now" (Sales director, WA, interview 5 February 2013). By 2013–2015 WA was partnering with multinational module vendors and was considered a substantial industry actor. WA was being positioned in the network by the larger players, but the managers of WA were only following their business relationships, rather than consciously seeking to adjust their network position. From 2013 to 2015 WA's employee base rose from 56 to over 100, many of whom were senior level.

4.4. Start-up network capability

By 2013 the manager of WA had developed network capability in interaction with other firms in its business network. This period is characterized by massive growth, but also an extended temporal horizon. This period was short, yet dense with events which were visibly more collaborative than independent (see Table 5). WA's partnership with the module manufacturers in December 2011 had strengthened and the business was now positioned as a fully integrated supplier into its customers' businesses. WA was now highly trusted and saw itself as a major player within the industry, rather than the outsider trying to get in.

The company at this point was in a position to purposefully manage parts of the network, in conjunction with other firms. WA could initiate, maintain, and terminate directly connected inter-organizational relationships to gain access to resources. This network capability was based on being 'in relationships', in which both parties were adapting, and working 'through relationships' into other relationships. Further, how these two parts of network capability aided network re-positioning was at least partly understood by the managers.

4.5. The processual development of network capability in the start-up case

Fig. 1, created from the case chronology, illustrates the major events unfolding over time in WA's development. Fig. 1 and Tables 2 to 5 provide the full event and activity sequence and supports our division of start-up network capability development into the three distinct periods. The development in each period occurs in interaction with other firms. Implied and apparent in the interactions with the other firms is a growing form of "mutuality". In each period the development of a deeper understanding of network capability is gradual. The events and sequence of changes in Tables 2 to 5 suggest that the manager/s generally only gains an understanding of the new ability after enacting a change a number of times with other actors. Most often the other actor is the key.

In period one the managers begin to resolve problems in relationships, and they do this a number of times without fully understanding that they have relied on the other party. Later there is awareness and a growing understanding of a new way to solve problems and finally a realization and comprehension, all within social-cognitive processes. In period two, problems are resolved a number of times by using one relationship to reach into another, and later a realization begins to grow and then a comprehension comes of a new way to solve problems. In period three, the pattern is found again, as the other actors in the network are brought into the firm's problem and solutions are found, yet the managers only gradually realize and comprehend that their problem solving process has a new type of logic.

This later realization of an understanding is consistent with Weick's (1988) interpretation of sensemaking, where the social process of developing meanings comes to a result after a change is noted and interpreted by managers. What is found in the present case is that there is quite a long lag before there is a change in understanding about a new option for resolving a problem. The start-up managers in this case seem steadfast in keeping their independence, but also as a start-up firm a key issue for survival is always solving problems and time for thinking comes later.

The division into three periods is supported by the way the solution to the problem solving is differently structured. By looking only at solutions, an outsider would consider that WA's managers understood much earlier the concept of applying a 'business relationship' to solve a problem. In fact it was only at the end of each period that the managers came to realize the solution was a result of the way connections between actors were configured.

In Table 6 we present quotes that show in a later period how the start-up managers see the actor connection of their earlier solution. During the 'in relationships' period the focus of problem solving is never more than between two firms and towards the end the idea of a relationship is being understood, at least partly. In the 'through relationships' period a set of two connected relationships is the focus of problem solving (e.g. WA-distributor and distributor-customer). Later during the 'in the network' period three or more firms and their relationships are involved in re-positioning. But at the beginning of each period the manager does not see this structural aspect; our informant was only focused on solving a problem by setting in-train an activity. Only later did the manager note and understand that they were thinking in a different way. The quotes in Table 6 note on the one hand that understanding comes later, but also there is a forward orientation of looking to the customer and an elongating temporal focus as each new understanding is enunciated (see Weick et al., 2005). The structural distinction across the periods and the disjuncture with the understanding of the managers emerged from our inductive case study.

Thus, we claim network capability is iteratively developed, and reliant for its build-up on the less intricate understanding/s of earlier periods. Also, in an iterative manner later understandings change earlier comprehensions. That is, understanding of a prior ability is needed in making sense of the next part of network capability, but conversely the deeper understanding gives new nuances to earlier ones. Further, developing an understanding of network capability, when there is none

Table 6
Retrospective and prospective social-cognitive sensemaking.

Understanding	Quotes – looking back, looking forward	Connections
In relationship	*"A meeting with a large automotive company was a big milestone as they were one of our first customers, the first product we developed and our first sales. … It was very relevant as it was a real buyer who gave us feedback on the issue that they were having with current products on the market – telling us what added features and benefits that they were looking for."* (Sales director, WA, interview 24 June 2008)	Two firms. One relationship.
Through relationships	*"Initially we dealt with distributors and customers. … Then we partnered with module vendors. … When a customer starts to design a product they will talk to the module vendors first, the vendors will explain that they need to think about antennas and recommend us. We are helping each other to fix problems for the same customer."* (Sales director, WA, interview 5 February 2013)	Three firms. One relationship and one firm in a connected relation.
In network	"*We are not inventing products ourselves, it is driven by our partners, module vendors, customers and the market. In product development, now we work with others including customers, partners and the module guys, even before the first schematic and operate as design partners from day one.*" (Sales director, WA, online interview 7 October 2015)	Three or more firms. Three or more relationships.

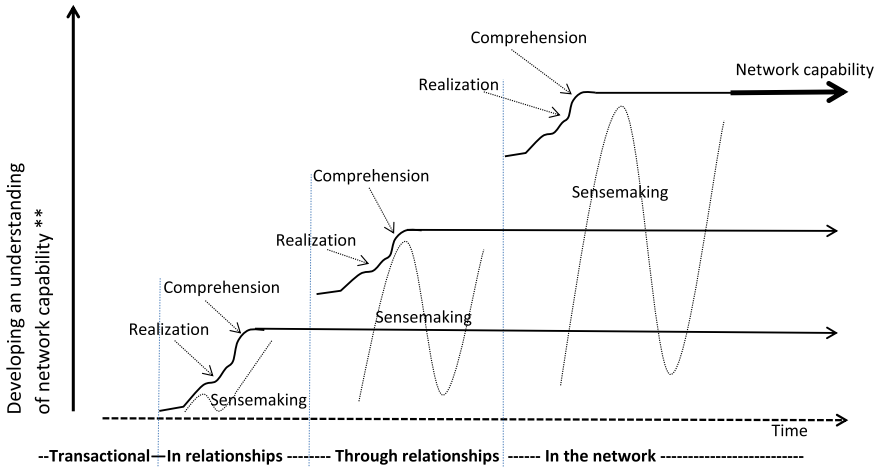

Fig. 2. The developing understanding of network capability by the managers of WA: A start-up firm in the international wi-fi aerial industry.

at the beginning, relies on finding chance solutions dependent on other interacting parties or accepting the proposals of other parties. The activities once set in-train later give rise to a growing realization, a comprehension and then a new qualitatively different and deeper integrated understanding. Our inductive method highlights increasingly deeper comprehensions by the manager before arriving at understanding network capability.

Another finding from the study is the change in temporal horizons (Andersson & Mattsson, 2010a,b). Apparent in Fig. 1 and the relevant tables are the temporal patterns of interaction. Within the twelve year study period are found events, sale opportunities, new investors, and new relationships, which arise and are noted by the start-up managers. The events have temporal significance, as the managers move from predominantly short-term and transactional to more long-term temporal horizons and at the same time embed the start-up more deeply into the emerging network. The managers of WA had a broadening temporal horizon, while at the same time they dealt with activities with both short and long temporal profiles. For example, in period one the relationship with the university antenna research unit appears and then fades when results are not achieved quickly. Conversely, in period two as the temporal horizon of the start-up lengthens, the events of note are those with longer temporal impact, for example, developing relationships with distributors to secure ongoing sales opportunities and to broker future potential customer interactions. Finally in period three the temporal horizon is considerably longer, where value co-creation is enacted *with* as opposed to *for* customers in ongoing sales interactions. Further, the developed network capability leads to partnering with multiple major players and a shift in focus from knowledge sharing practices to, at the end of period three, networked product development.

5. Discussion

We present the model of how a start-up manager's understanding of network capability is developed over three periods in flowing time. There are two separate sets of concepts: (A) managing (i) in relationships, (ii) through relationships, and (iii) in the network, and (B) the changing in the problem solving and socio-cognitive process following from a deeper understanding. We first present a general discussion, before detailing in different sub-sections the more specific changes in understanding of each period.

Fig. 2 provides a temporal understanding of how our managers of the case study firm emerged in network capability over a twelve year period. Our findings section, based on a temporal analysis of events and activities provides the empirical rationale. In the model each element is separated by a qualitative leap in understanding regarding the role of a business relationship. But first we note the gradual realization that managers have in each period. Thus, in Fig. 2 the building of understanding in each period is shown as gradual with network capability finally being developed in the firm, and learned in interaction and understood by the managers at the end of period 3.

Second, the leap in understanding displayed between the periods in Fig. 2 displays an iterative development process, with the preceding understanding built upon and merged into each deepening comprehension (shown in Fig. 2 by the broadening sensemaking processes for each period). The stepped effect denotes a qualitative change in understanding, where the new provides nuanced meanings regarding the former. The nuanced meanings of the former only become available as a new framework is gradually understood and developed. Table 7, developed from our case study, provides the main constructs involved in managers developing an understanding of network capability.

The WA case emphasises that the capability of managers to interact in relationships, through relationships and in a network was clearly not an in-built ability or skill in the start-up's business toolkit. McGrath and O'Toole (2013, 2014) have identified constraining and enabling factors in the development of network capability. That research questioned the assumption that a firm is born with network capability. In our study the managers' capacity to consider a sequential, expected process of an 'evolving' network capability was not found. Further, there is evidence in the case that the managers sought to avoid the interdependence found in business relationships. For start-ups, with limited network capability, the trials, failures and successes required for interacting in and through relationships and in the network takes experience, as well as gradual and sudden delayed realization of how each relationship ability works and over time builds on the other. We know that capability development processes take time (Helfat & Peteraf, 2015; Montealegre, 2002). It was surprising that in the case of WA, the final evidence of a developed network capability emerged after almost a decade.

Given that other events and understandings might have intervened, one might argue that the learning process might be faster for other managers, or be side-tracked by different opportunities, or revert in other start-ups. Indeed, some start-up managers might conceivably get 'stuck' or decide to remain in a particular and less complex world view, with a less developed understanding of network capability. The notion of managers and firms being at different points in both their understanding and development of network capability fits theoretically with the ideas of network context, defined as the way connected firms are seen as relevant (Håkansson & Snehota, 1989). The context of the start-up as experienced in interaction by managers, and the nature of their

Table 7
The core concepts arising from the case.

Concepts	
In relationships	The start-up managers move beyond unilateral actions and learn to interact in key business dyadic relationships to access activities and resources. Mutuality is apparent in developed relationships.
Through relationships	Through a relationship the start-up managers become able to connect to activities and access resources in another relationship.
In the network	The start-up, through multiple relationships, has developed the ability in conjunction with other firms to adapt resources and activities in a network, and in doing so changes relationships. There is a deeper understanding of the firm's network. The 'in' and 'through relationship' abilities are combined with the ability to change relationships 'in the network'. The start-up is able to handle multiple actors in creating value for itself and these other actors.
Problem solving processes	A qualitative shift in the problem solving ability: (i) an initial atomistic approach, (ii) a joint problem solving approach, (iii) joint solving through and into other relationships, and, (iv) problem solving with a range of network actors including competitors. The shift to complex business problem solving was made possible through experience in interaction and by the behavior and actions of other network actors.
Social-cognitive processes	The start-up managers' understanding of relationships and networks shifts and deepens across the three periods through a gradual realization of how activities and resources are adapted in interaction and in mutual relationships, as their cognitions catch up to problem solving behavior.

inherent network theory (Mattsson & Johanson, 1992) will set some parameters on how a manager views its business-to-business relationships and networks and thus its changing network position. Much of what happened in our case start-up firm depended on the interaction experience of the managers and how they latter made sense of how other firms were acting. Thus, we suggest that network capability requires the input and reciprocation of other actors, and that desire or intent is likely differentially spread in networks.

5.1. Periods of start-up network capability development

The model begins at the point where the start-up commences its initial relationships through using its 'born with' network connections such as personal contacts, the first customer and advisory and other contact points in the network. Much early network activity is constrained by the need to access resources to survive (Aaboen et al., 2013; Baraldi, Gregori, & Perna, 2011) and by the independent rationale of the start-up founders in setting up the new business (Birley & Westhead, 1994). At this point other firms in the network are mainly unaware of the start-up, so beginning to develop network capability is difficult.

5.1.1. In relationships

Throughout this first period the start-up managers develop an understanding of the role of business relationships as a means for providing adapted resources of value. At the beginning, the start-up manager appreciates that resources are held by other actors, and then begins to develop an understanding that a relationship provides the means to adapting and creating qualitatively different resources.

Often relationships are viewed by the start-up firm as entirely functional and transactional. In this case there is little or no co-adaptation of resources accessed from or provided to the other party. However, the start-up firm does experience, in interaction, the benefits and drawbacks of having a portfolio of direct business relationships. For example, relationships are the source of some resolutions to resource constraints (Gulati, Nohria, & Zaheer, 2000; Hite, 2005), including finance, information and expertise (Uzzi, 1999). This experience begins the shift in understanding towards the idea that relationships enable the adaptation of resources to gain additional value.

The realization that resources are adaptable because of the qualitative nature of a relationship begins the movement from outsider to tentative network member. Thus there is some building of, and gaining of, legitimacy and reputation in the market (Lechner et al., 2006; Stuart, Hoang, & Hybels, 1999). At the same time the start-up managers begin to see the potential of working in relationships. The potential arises in particular and specific problem solving inside relationships, and is driven entirely by the need to access resources and markets. At this early time the network of firms is not really in view and the temporal horizon is limited.

5.1.2. Through relationships

This period begins with the realization that relationships are "conduits, bridges and pathways" (Hite, 2005: 113) to other relations in the network. The managers of the start-up have begun to see the network through the ways their direct relationships extend to connected business relationships. At the beginning of this period the start-up shares more information and knowledge with its partners, the temporal horizon begins to extend inside some relationships and the resource configurations, while still easy to define, begin to be more complex.

Initiation of a 'relationships through relationships' ability can arise from either party of the exchange. In this sense the developing understanding of relationships is always shaped by the specific network context, but that is changeable. For example, a distributor who cannot solve a problem for an existing customer may connect the entrepreneur in a bid to solve the issue. Similarly, an entrepreneur may direct an existing customer to the distributor to source other resources necessary to fulfil the customer's needs. Whether these relationships develop is moot, and can only occur when both parties see value. A key new and essential understanding is that resources in the other relationships of their business partners affect adaptation within their own relationships and vice-versa. A further realization was that accessing resources and activities in indirectly related relationships is a departure from a simple dyadic focus.

Important to note is the iterative building of understandings upon each other. The competence inside relationships to adapt resources can facilitate the development of the 'relationships through relationships' ability. Further as understanding of relationship through relationship develops there is also a reappraisal and a new understanding of resource adaptation in relationships.

5.1.3. In the network

At the beginning the start-firm is moved into or invited into network positions by partner firms. This allows the managers of the start-up firm to gain a deeper understanding of the network and their temporal horizon is extended. But then the start-up managers begin to understand the network, and through and in their relationships they begin strategizing. Now the start-up firm can see the changes in final customer needs almost as soon as the customers begin defining their own customers' needs. The purpose has gone beyond a simple need to adapt resources in connected relationships to a wider overview and realization that security of value creation can be generated by positioning the firm in a network.

As the firm evolves in the network the start-up managers'

understandings of how value is co-created leads to coordinating activities across a number of parties. In this period more complex problems can be solved through the configuration of resources (e.g., information and technical) among multiple players (McEvily & Marcus, 2005; Uzzi, 1997). The start-up firm is now active within the network, dealing with problems through other actors jointly, both in their own interest and, over time, in the interest of other network actors.

However, developing network capability is an on-going process, the beginning is ill-defined and the capability is continually re-developed as new events arrive from across the network. A firm and its managers, on the evidence of an ability to re-position with other firms in a network, can be said to exhibit network capability, but that capability is always being refined and re-established. The network capability sees an understanding of how multi-party configured activities, resources and relationships continually re-position the firm in a network.

5.2. Sensemaking processes of developing network capability

For network capability to develop, we argue that managers need to engage in sensemaking practices, where they attribute meaning to their actions and interactions, so forming and reforming the meaning structures that guide their relational behavior. Prior studies have alluded to sensemaking processes to be insightful in inter-organizational settings (Henneberg, Naudé, & Mouzas, 2010) and for network development processes (Halinen, Törnroos, & Elo, 2013; Medlin & Törnroos, 2014; Möller, 2010). For network capability to develop in a start-up, we found two predominant sense-making processes: problem-solving and social-cognitive processes. We address each of these in turn.

5.2.1. Problem-solving processes

Problem solving processes are the essence of how start-ups experience the world and, in turn, this shapes their world view. As a process, successful problem solving is in the joint space within a relationship (McEvily & Marcus, 2005) and is a co-engaged and collaborative effort. In the beginning the start-up is concerned with gaining access to resources, and as a connection deepens the problem-solving process leads to an understanding of how the relationship is allowing adaptation of resources (Greve & Salaff, 2003). In the second period problem solving begins to account for other connected relations, while in the full network capability there is some understanding of network positioning in and through relationships as a part of the firm's problem solving processes. Thus, the problem solving processes become more sophisticated as network capability develops.

5.2.2. Cognitive processes

According to Weick (1979, 1988) a cognitive sensemaking process follows the actions, which are themselves based on an ambiguous world view created on the basis of past activity relative to understanding. Sense-making processes involve both the start-up mind-set and interaction processes in and through relationships across the network (Laari-Salmela, Mainela, & Puhakka, 2015). Hence, moving through the three periods of network capability development is based on events and activities which prompt the re-configuring of the managers' world view. There are two cognitive processes at work: firstly the gradual realization and development of a comprehension in each period of capability building as in Fig. 2, and secondly, the cognitive process leading to a qualitative leap in understanding. Each leap in understanding brings entirely new vistas and new comprehensions of the network and the purpose of relationships in the network (see, Fig. 2).

Throughout the process of developing their understanding of network capability the managers are moving further towards interdependence in their mind-set. The managers' understanding of network context develops. Further, the network horizon, the awareness of who are the related firms (Holmen & Pedersen, 2003), is expanding. Finally, these changes in understanding are found by applying longer and changed temporal horizons (Andersson & Mattsson, 2010b; Sztompka, 1994). All of these changes can only occur over time and the learning involved requires interaction with other firms.

5.3. Summary

We set out to study how managers of a start-up develop understanding of network capability, as their business grows. Our case study firm began with two people and grew to become an international business in the short range wi-fi industry. Over the twelve years of the study the start-up managers developed an understanding of network capability over three distinctly different periods, but also as the firm grew there arose an increasing ability to shape their network context in conjunction with other firms. The change in understanding followed a pattern of gradual and fast changes in comprehension, according to our mapping of events and activities, the temporal profiles of the activities, and the informant's ability to articulate the firm's changes in activity.

The interplay between the network context (Gadde, Huemer, & Håkansson, 2003; Håkansson & Snehota, 1989) and network horizon (Holmen & Pedersen, 2003) and the start-up managerial temporal horizon and the temporal profile of events (Andersson & Mattsson, 2010a) was a noteworthy finding from the event analysis undertaken. Our findings suggest that combining the concepts of network horizon with the temporal horizon and the temporality of events can help start-ups in developing their understanding of network capability. For example, at E^{13} WA was attempting to strengthen relationships and at the same time extend their temporal horizon with distributors through a visit program and financial incentives, with events moving to a longer-term relational focus. However, by E^{17} the customers were increasingly approaching WA directly and hence the temporal horizon and corresponding events moved from a long-term relational view back to a short-term approach. This new mutuality with the customers moved the distributors away from the immediate context, so that they were closer to the managers' network horizon. The same holds true for the early mentors, who were heralded as indispensable and long-term relational actors in period one and at the beginning of period two, and yet these actors faded into the network horizon or beyond as the firm replaced them with in-house capability. For start-up firms some relationships are, over time, removed from the immediate network context and may even depart into the network horizon, while others are drawn in and yet others iteratively move between the two.

Our Fig. 2 model highlights that, as an understanding of network capability developed, the managers became more purposeful and strategic in their influence, with deliberate use of business relationships and network activities based on longer temporal horizons. Particularly important was access to needed changes by final customers and so, not in this study but implied, is early access to information concerning technology change. Our inductive study shows that the match between the managers' temporal horizon and the specific temporal profile of events and activities inside the involved relationships is important in developing network capability, with other firms. Hence, both temporal and network horizons are involved in managers' understanding and in developing network capability. This conclusion is apparent because our study was time sensitive and longitudinal.

6. Conclusions

Recent studies within the industrial network literature have addressed network capability as a source of real value to the firm and to its network of relationships (McGrath & O'Toole, 2013, 2014; Mitrega et al., 2012; Thornton et al., 2013, 2014, 2015; Walter, Auer, & Ritter, 2006; Wenhong & Tan, 2009). Often network capability is assumed to be present or it is an ability which naturally develops; however our study shows that for a start-up firm this cannot be taken for granted, nor can how it develops. If the managers of other firms had a transactional approach, the development of network capability by our informant would not have occurred. There was no naturalness to the development

of an understanding of network capability.

Taking a start-up within its natural habitus would envisage working on current relationships to move them from solely transactional to also relational, then through relationships to work into other relationships, and finally into the network. In these three deepening understandings the modes of interaction, resource and activity commitment and adaptation become more complex and integrated. But equally, substantial disruptions in the network might require significant changes, and so managerial understanding of network capability is re-tested continually by the actors. New customers and firms come to the fore, and others recede beyond the managers' network horizon. The newly arriving firms, as with our case firm, may lack an understanding of business relationships and networks. In fact the managers of firms in any part of a business network are likely to exhibit different understandings about how to work in a business relationship, through relationships and in a network. The way activities are introduced, pursued and framed with reference to a context of relationships within a network can enable managers to gradually gain a deeper understanding. A moment can arise where a manager begins to grasp a deeper understanding of how 'in relationships' can aid in working through into other connected relationships or how working 'through relationships' allows working in a network. These managerial leaps of understanding might occur in many different contexts, but other firms and managers and the interdependent and mutual experiences they provide are likely essential elements in the transformation of understanding.

Our model differs from other relational based process models in that we do not look at network capability development linked to the lifecycle of the start-up (Greve & Salaff, 2003; Hite & Hesterly, 2001). Nor do we assume that relationship development is at the outset strategically planned, with the start-up purposefully seeking necessary resources at each stage and adjusting their relational mix accordingly (Lechner et al., 2006). Thus, we do not see the punctuated equilibrium concept found within a systems perspective (Gersick, 1991, 1994). Instead, we see the development of an understanding and network capability which is found by some managers when the activities applied to problem solving are reflected upon in a social-cognitive sensemaking process, which in turn highlights the interdependent and mutual aspects of business relationships and networks.

Given the experience of our case study manager and firm, an understanding of how to 'manage' in business relationships is not a natural ability, nor even one that is ever fully mastered. There is no single point in time at which capabilities magically appear (Montealegre, 2002), and the temporal pacing of the movement between the periods of network capability development is not predictable. Network capability does not 'evolve' according to a force or a mechanical development, but rather there is a changing managerial understanding in conjunction with a growing mutuality between firms. Equally, there can be a reversion and a desire by managers to reduce their reliance on a relationship or a network, which might call for an even more nuanced application of network capability. The literature on ending business projects and relationships gives insights in this direction (Havila & Medlin, 2012; Havila, Medlin, & Salmi, 2013; Havila & Salmi, 2009; Tähtinen, 2002; Tidström & Åhman, 2006). In a network approach developing a refined understanding of network capability is likely an on-going process based on maintaining awareness and an openness to how other actors sense and understand their network view.

For start-up managers the insight that interdependence and mutuality provide access to resources, points to the essential processes of joint problem solving and social sensemaking processes within relationships and across parts of the business network. Also important is an awareness of and a sensing of the various temporal horizons and the temporal profiles of events and activities inside a specific business problem, and who are the actors required to move forward on an opportunity. Selection of partner firms and continual adjustment of specific relationships remains a key, as always, in how managers develop their firms' network capabilities.

Specifically for start-up firms, in which managers likely have a low base of understanding about network capability, there is a need for education concerning a way of doing business and strategizing which operates from a basis of interdependence. Ford and Håkansson (2006a,b) discuss the differences between an independent and interdependent world view, but our paper points to how an understanding of network capability is developed. Start-up managers commence their businesses with socially embedded ties (Larson, 1992; Lechner et al., 2006), but it is through understanding the different resource and activity layers in relationships and how they are applied to solving problems that managers begin to comprehend network capability. This suggests that with time and experience, the managers of start-ups are capable of constructing new relational based strategies and business routines. Once network capability is developed, managers have access to relational strategies, which give a type of flexible security and openness to undertake adaptations to ensure long-term resilience or growth. Inherently, firms are embedded in a nexus of external relationships, but translating this into a capability, or thinking about it as a strategic possibility on which to grow and develop the business involves challenging a start-up manager's worldview and rationale for being an entrepreneur.

Consistent with the entrepreneurship literature, the WA case study suggests that relationships and networks play a significant role for a start-up firm to attain, ultimately adapt and jointly integrate external resources to survive the selection pressures and over time grow their business (Dubini & Aldrich, 1991; Hite, 2005; Lechner et al., 2006). Further, our study demonstrates that, for WA, business interactions were neither independent nor objective, but rather there was a subjective interpretation by those involved, in-line with the industrial network literature (Ford & Håkansson, 2006a; Mattsson, Corsaro, & Ramos, 2015). This subjective interpretation underscores the need for temporal research in industrial marketing (Ford & Håkansson, 2006b; Quintens & Matthyssens, 2010), and the need for new knowledge concerning a managerial understanding of how to develop network capability by start-up firms.

This study points to the time periods involved in moving towards understanding network capability and the accompanying sensemaking processes. Illuminating these changes also uncovered some reasons why so many start-up firms do not achieve a network capability. Developing network capability requires a change in the way a start-up manager understands business relationships and their purpose. This change from an independent to an interdependent orientation is either possible through interactive experience or by an educational process that likely can only to be tested by experience. Start-up network capability development is iterative and contextual and, while the ideas might be understood in advance, most likely there is a need for experience in interaction as well.

The study is not without its limitations. First, this study is based on a single case and not every start-up will follow a similar trajectory. Also, while there is no way to generalize formally to other situations, because the founders were embedded in specific times and places. We note, as did Eisenhardt and Martin (2000) that capability outcomes are quite clearly observable. However, our study also underscores that while network capability might be observed, the depth of the start-up managers' understanding is an entirely different matter. Even so our qualitative research outcomes are available for transfer, although always differently in a specific situation and context (Lincoln & Guba, 1985).

Second, some start-up managers may progress and develop their network capability at a quick pace and others much more slowly; hence the temporal periods may alter. Progress towards network capability may be impeded for many reasons including the very rationale for which the business was set-up: to be independent and to have control over business decisions. In addition, firms may revert back after a negative experience in a relationship. Poor relationship experiences might result in a firm never developing network capability.

Regarding future research, many options are uncovered. First, the

presented model calls for research. Next both of the sensemaking processes and the three understandings present many further research questions. We identified two core sensemaking processes in our research, but there may be others. The extant empirical research on social-cognitive processes in building business relationships and networks is limited and other sensemaking processes might represent a novel departure in addressing the nascent firm's ability and desire to emerge into network capability.

The start-up firm is an essential component of a dynamic network. Research taking an industrial network approach to the start-up is encouraged both in its own literature, this special issue being an example, and in the entrepreneurship literature. Our contribution to temporal perspectives on how understanding of network capability develops fills a gap which stops many start-ups from achieving their goals. No firm is an island (Håkansson & Snehota, 1989), but many start-ups pursue their independence, rather than learn that all firms survive and grow by collaboration (Håkansson & Snehota, 1995; Van de Ven, 2005). In the case of the start-up firm in our inductive study, while the nature of the business problems and the day-to-day imperatives remained constant, the ability of the managers to achieve goals was based on their growing realization, comprehension and understanding of how business relationships and their connections within a network context could provide the means to adapt and adjust until they became an established international player.

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