Interacting for legitimacy: A dynamic perspective on institutionalization in business networks

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Abstract

The role of institutions in providing a past and future loaded network for supporting and shaping business interactions has received limited attention within a process ontology. Institutionalization theory proposes that actors gain legitimacy through pragmatic, social and cognitive processes. However, the interaction processes between actors that lead to legitimizing are not well explicated, mainly because the conceptualization of dynamics is left implied. In this paper we apply an explicit dynamic perspective, which notes different paces of change to understand actor-legitimizing processes in an emerging business network. We introduce and apply the concepts of intra- and extra-network for firms and social entities according to degree of dynamic stability in the empirical setting. Our theoretical perspective is exemplified by a case study of an emerging biofuel network, where funds and joint actors are sought and gained through different phases of legitimizing.

Key words: Network change and emergence, process research, actors, network levels, biofuel development

INTRODUCTION

The nature of the actor in the industrial network literature is many-sided and problematic. The actor can be an individual, a department, a firm (Håkansson 1982), a relationship (Håkansson and Snehota 1995) or a group (e.g. trade or industry association), government body, or a collective action social movement (Brito 2001). According to Brito (2001) institutional (collective) actors play an important role in landscaping the network by legitimizing and mobilizing resources.

In the marketing literature firms are positioned and embedded within an institutional 'environment', wherein business is conducted. In this environment collective actors provide social legitimizing mechanisms (Benson 1975; Brito 2001; Deligonul et al. 2013). Following this approach, Lukkari and Parvinen (2008: 965) note that "... actors, and institutional bases are imported into companies as underlying invisible assumptions that shape their performance". As a result there has been an increasing interest in institutionalization and legitimization processes when firms and collective actors interact (Brito 2001; Deligonul et al. 2013; Nyström et al. 2014; Oliver 1997; Persson et al. 2011; Salmi 1995; Tornikoski and Newbert 2007). However, there is a need to account for the different dynamics of collective actors and firms, with regard to purpose and timing, so that the processes are more clearly established. We expect also that this research will illuminate theoretical development of the actor concept in the industrial marketing tradition.

This research paper adopts a social constructivist and network perspective of legitimacy, rather than a systems approach, and scrutinizes how actors can develop their position and role in social and technical networks. Thus, there is an inter-play between the social meaning aspect of legitimacy and the on-going events, acts and activities of business actors seeking to develop network positions to enhance their goals. In this temporal perspective of a network business and institutional actors are ephemeral and changing (Czarniawska 2009). But stability is also needed to comply with societal needs, regulatory systems or legal matters. To capture these distinctions we introduce a framework based on an intra- and extra-network (Benson 1975), where each has different dynamics. To ground our perspective we explore emergence, innovation and technical development through the lens of different actors' in a dynamic network.

The paper is structured in the following manner. First research on legitimacy and in industrial networks is discussed followed by a discussion of dynamics. Next a conceptual framework is presented. Third, we introduce the methodological and data gathering procedures. Fourth, an empirical longitudinal case study reveals institutional processes in combination with interaction and innovation in the energy sector as it unfolds over time. Fifth, an analysis of the case in light of the conceptual framework is undertaken. We complete the paper with research and managerial implications.

LITERATURE

Legitimization is a core concept in institutional theory (Parsons 1964), but care is required in theory development and methodology because there are deep meta-theoretical differences, and also different understandings of culture and agency (Suchman 1995). A particular distinction, which we consider critical, is that between institutional and strategic perspectives of legitimacy (Suchman 1995). The first sees institutions as shapers and constructors of firms

and other actors through cultural and belief structures (Suchman 1995). According to Suchman (1995), in this view institutionalization and legitimization are almost equivalent. The second strategic perspective has firms apply symbols and actions to build legitimacy (Suchman 1995). We contrast these two perspectives on change and apply the terms: outside-in and inside-out. In our view each of these perspectives is a partial view, capturing only a specific part of change; whereas a processual view sees these perspectives as woven together in processes. We neither wholly maintain the consistency of beliefs evident in the outside-in institutional view, nor do we follow the systems approach of the second (cf Vargo et al. 2015). Rather our moderately constructivist perspective is of networks without teleology, except that espoused by firms or collective actors (institution) where outcomes and goals are constrained and enabled by forms of collaborative activity.

Legitimacy

Suchman (1995: 574) defines legitimacy in a business setting as "…a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within a socially constructed system…". This definition notes three elements: (1) the social construction of legitimacy according to a set of culturally condoned beliefs, (2) the three bases for legitimacy, and (3) an evaluation about an entity and its actions according to a cultural set of meanings. We next elaborate each of these elements.

First, the social construction of legitimacy points to a process of interactivity between firms and collective actors, which is spread through time so that history and future are features of meaning development. Further the meaning developing is with reference to a wider set of cultural beliefs. What we wish to draw from this point is that legitimacy is connected to the wider understanding of each society's or group's worldview. For example, when sustainability gains favor the set of social meanings begins to provide forms of legitimacy to firms working on these issues.

Second, three bases for legitimacy are espoused (see Table 1). These bases provide justification and social rationalization for the way ideas and beliefs are associated within the set of cultural meanings. We note that the bases relate to a human's condition; namely each of us is an individual and so pragmatic self-interest is a concern, we are social and so norms and expectations are at play, and finally we are each thinking beings and so there is a cognitive dance. The passing of time and the social stability of cognitions ensures that contradictions, ambiguity and differences arise in any set of beliefs and meanings. The meanings also likely differ between societies or in the wider network where actors interact. Thus, in a changing environment a set of meanings is stable until there is a cultural shock.

Table 1: Three bases of legitimacy by different authors

Authors	Individual (strong)	Social (strong)	Cognitive
Suchman (1995)	Pragmatic (desirable)	Moral (Proper)	Cognitive (appropriate)
Scott (2001)	Regulative	Normative	Cognitive
Yang and Su (2014)	Habitualization	Social regulation	Validation

Third, legitimacy is a "perception held by an organization's external audience" (Tornikoski and Newbert 2007: 315) and actors continually evaluate legitimacy, even though "it is an unobservable construct" (Tornikoski and Newbert 2007: 315). The three bases of legitimacy are open to appraisal in the actions and activities of every entity and institution, according to how an actor understands history and intent. Equally legitimacy is continually socially re-affirmed. Suchman (1995) notes this evaluation issue, by asking: legitimacy for what? He

also argues that two dimensions provide answers: (1) continuity versus credibility (persistence in network or mandate in set of beliefs), and (2) passive versus active support. This distinction rests upon how another actor, a member of an audience, undertakes action. "To avoid questioning, an organization need only "make sense." To mobilize affirmative commitments, however, it must also "have value"- either substantively, or as a crucial safeguard against impending non-sense." (Suchman 1995: 575). However, in the and/or logic of a constructivist and network approach these dimensions cross and combine over time.

We now draw attention to a meta-theoretical perspective that is present in our elaboration. A key aspect of legitimizing is the temporal and processual aspect required for appraisal. Both history and implied intent matter and these are appraised according to a social sensemaking process (Weick et al. 2005). Legitimacy relies on social and individual interpretations of "events, actions and activities unfolding over time in a context" (Pettigrew 1997: 338). In the present period the issue of which bases of legitimacy are apprehended depends on the interactions between entities: that is legitimacy is a relational construct.

Also the call to a legitimacy base is dependent upon understood past and possible futures. Suchman's (1995) dimension of continuity versus credibility speaks to temporality and meaning system, while that of passive versus active support is concerning a processual reality. Thus, these two dimensions, when seen as temporal processes contrasted with a set of cultural meaning are open to problematization. This issue is likely to work in specific ways in certain business relationships and emerging network structures where interaction and relationships are handled.

Suchman (1995, 574) concurs when further elaborating the definition with the following points. Legitimacy:
- is perceived/assumed and resilient to particular events,
- represents an umbrella evaluation in transcending diverse acts or occurrences,
- is possessed objectively but created subjectively, and
- reflects a congruence between the behavior of the legitimate entity and the assumed beliefs depending on particular observers.

Thus, one can also note that legitimacy is about symbols and a set of meanings more than about actions. Actions can be contradictory to a legitimizing symbol or idea, and a new evaluation does not change the bases of legitimacy held in the social sphere. Consequently, we consider that legitimacy resides more in the audience actors' social understanding and set of meanings. This means that confirmation by acts and activities requires more effort to achieve legitimacy than does complying with social understanding.

Placing legitimacy in the social meaning sphere also aligns the concept with money and power. Legitimacy is sought in order to finance or get approval from venture capitalists or business angels or governmental institutions. Successfully gaining finance is a type of legitimacy and creates a "proper" and legitimate value for further development of the firm in relation to the network of legitimizing and other actors. We build upon this divergence shortly.

Business network research and institutional legitimacy

In this section we turn our focus on where institutional theory and legitimacy are applied in business network contexts. First we discuss literature primarily following the outside-in view: seeing networks through an institutional lens. Next we discuss research taking an inside-out or mixed view: how a firm network integrates with institutionalized actors. These discussions

can clarify theoretical distinctions to connect and also separate the collective actor from the business (economic) network.

Institutionalizing the network
Osborn and Hagedoorn (1997) exemplify an outside-in perspective, where collective actors are dominant. Here the collective actors experiment in building new institutions by trialing alliances and networks, which "represent solutions to both the needs of sponsors (for whom alliances are frameworks for action) and alliances as action takers …" (Osborn and Hagedoorn 1997: 272). Following this reasoning the authors see the actors of the network as "socially [in the institutional meaning] constructed action takers" (Osborn and Hagedoorn 1997: 272); while institutions are sponsors. This social perspective leads the authors to suggest that different 'rules' or a 'logic of association' exist for a balanced exchange.

The ideas presented above are adopted by Deligonul et al. (2013) in seeking to understand how a supply network (IKEA) adjusts when under the influence of a local and also an international set of institutions: isomorphism is described as an outcome of consistency between institutional constitutive and behavioral dimensions. Here the authors present the constitutive dimension as the "rules, norms, standards with which the functional aspects are legitimized." (Deligonul et al. 2013: 511) While the grounding of the constitutive dimension is left open, we can see that the issue of legitimacy is flowing from the institutional sphere to the network. In their summary the authors present the following key ideas (see table 1). What is immediately evident is the social overlay of connected ideas across the behaviors of the local supply firm and their staff. However, since the choice of the institutionalized actor was not open, the opposing inside-out perspective is not addressed.

Table 1: Mechanisms, logic and legitimacy processes evident in the IKEA case*

Mechanism:	At the onset the mechanism of developing influence is regulatory (coercive), then it shifts to normative by giving identity to members, knowledge sharing. … and developing goal alignment, and finally after internalization of the institutional influence, members' behavioral consistency sustains itself by imitation of peers (mimetic tendency).
Logic:	The regulatory base for influence is established by contractual provisions in which rules, laws and sanctions are put in place for instrumentality of the influence. Normatively, on the other hand, the system is governed by a moral code, a silent acceptance of social order which is implemented in certification and accreditation of members. Cognitively, an embracing culture is instilled which endorses isomorphic behavior of members.
Legitimacy:	At the onset, the acceptance of the partner as part of the institution is sanctioned by contractual specifications. Second, the moral and social acceptance emerges in the normative venue by interaction, training and social governance. At the end, cognitive mechanism dominates and the legitimacy emerges in the process by creating a common understanding of what is understood as normal in the system.
* Source: Deligonul et al. (2013: 514)	

Similarly Andersen, Christensen, and Damgaard (2009) apply Scott's (2001) three institutional pillars and discuss how the institutional environments influence firms from different parts of the world and how this influence shapes their expectations within inter-firm relationships. They argue that the legal, regulative and cognitive pillars in society can influence norms and expectations within buyer–seller relationships (Andersen et al. 2009).

Yang and Su (2014) present a special issue on institutional theory in business markets. These authors see an essential trade-off issue: how can an organization keep one eye on efficiency and one eye on legitimacy. Thus, the firm's economic outcome is contrasted against social goals. Economic practicality and a social meaning system are juxtaposed. Yang and Su (2014) also note the issue of analysis levels (i.e. macro, meso and micro environments) and following a system's logic from institutions to firms end with strategic responses: isomorphism, coupling and decoupling.

In conclusion we see two interesting issues with this outside-in approach; firstly the institutions being legitimized are effectively arms of a large collective actor (i.e. society). In this case powerful collective actors generate forms of stability and only enable change in ways that shore up the dominant ideas of the society. This follows also from way institutionalization and legitimizing are held strongly in the social meaning sphere. Thus, the set of meanings is complete while stable, and so the new is not so apparent (Streeck and Thelen 2005). Change for the outside-in perspective is small and hidden inside the adaptive responses between the actors.

Second, the issue of how performance is measured is moot, for what is the measure when the rules of association are balanced. Osborn and Hagedoorn (1997) note this issue and ask: (1) how are self-interest goal driven firms in networks activated to pursue societal outcomes? (2) how is collaboration to be organized to yield best performance? (3) how are short and long term outcomes calculated? These issues are all on-going research (Barringer and Harrison 2000; Park 1996) but only recently are they being discussed within the industrial marketing literature (Medlin 2006; Munksgaard and Medlin 2014).

Networking with institutional actors
In this section we discuss literature that primarily adopts an inside-out view of change. There is some degree of ambiguity in this categorization, because any consideration of a collective actor has ramifications back to the firm network. This literature extends the sociological argument between agency and structure (Osborn and Hagedoorn 1997).

Tornikoski and Newbert (2007) examine quantitatively nascent entrepreneurial organizations to test the actor characteristics and the activities associated with organizational start-up. Their assumption is that entrepreneurs who achieve different levels of organization emergence have developed a position of legitimacy. This approach follows their assertion that legitimacy is a matter of perception. They test two forms of legitimacy: conforming, which amounts to association with credible symbols; and secondly strategic, which concerns credible activities. There results suggest active pursuit is more important than passive, as indicated by Suchman (1995). Also, as one might expect for nascent firms, actively and strategically seeking legitimacy by re-combining resources is a key association explaining entity formalization. These authors also examine use of social networking activities (e.g. asking for funds, receiving outside assistance, and establishing credit with a supplier), but only 'asking for funds' was stable over all regression models in explaining organization formation. The use of cross-sectional data can only imply the existence of legitimizing processes, and so Tornikoski and Newbert (2007) suggest to undertake research based on 'event history' to capture dynamics and sequencing affects.

Brito (2001) develops an integrative inside-out and an outside-in approach. In this research actors in the Portuguese wine industry develop collective action institutions to legitimize and normalize activities, but also they adapt rules to a changing internal business environment. Similarly, Lukkari and Parvinen (2008) research how pharmaceutical firms build legitimacy by sponsoring research in public institutions. Thus, there is a contrast between the self-interest of the actors and the collective action historically developed within institutions to support those interests within the broader network.

Another research stream follows a strong inside-out perspective and seeks to understand how firms within a local network gain legitimacy. Low et al. (2007) specifically address legitimizing as a process in a network setting, by extending two aspects noted by Parsons

(1977); legitimation and justification. They define legitimization as the "process in which specific network and relationship legitimacy orientations are generated."(Low et al. 2007: 98) After many interactions and also over time legitimacy is given by other actors inside a close network setting (Low et al. 2007). Persson et al. (2011) similarly apply a local context but study all three bases for legitimacy within a social setting. They find that all three bases play a part in socially acceptable activity generation.

To conclude, the three bases of legitimacy (Scott 2001; Suchman 1995; Yang and Su 2014) are available as mechanisms for firms in their interactions with each other and with collective actors. These studies have only begun to build our understanding of how industrial network thinking might be enriched by institutional theory. There is especially a need to scrutinize the processual perspective by applying a dynamic network to capture the legitimizing processes.

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Temporality and legitimacy

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The temporal dynamics of institutionalization and legitimization have been rarely elaborated. Yet institutionalization is a process of developing, maintaining and fading of collective actors. Dacin et al. (2002) devote a special issue to these matters but conceptualization of change also requires strong time theorization.

Lawrence et al. (2001) modeled the diffusion of institutional processes according to pace and stability, by applying a power mechanism model. The approach by these authors is counter to a constructivist approach, but enlightening regarding how to conceptualize the interactions of a collective actor (institution). Lawrence et al. (2001) conceptualize the context as either episodic or systemic and the target as either subject or object (i.e. 2x2 matrix). Given our constructivist perspective we can leave aside the two cells where the actor is an object because in these instances the institutionalizing mechanisms appear as an environment for the actor (or a set of legitimized entities). For example, in an episodic context the actor has a face (e.g. The Food and Drug Administration, (FDA) in the USA) and in the second case the actor is reified as the 'system'. In both of these contexts firms are required to comply. In a constructivist view where interaction is a key to change we focus on the two categories where the target is a subject.

Where the target is a subject, interaction and agency are key mechanisms. In the case of an episodic context each actor is open to influence by an institutional actor, either through decision making, non-decision making, manipulation and/or coercion. However, where the context is systemic the interaction is mainly outside-in and is based on the sociological construct of discipline (i.e. surveillance, normalization, examination) (Lawrence et al. 2001). However, in a processual view these two sets of mechanisms, influence and discipline, are available to an institutional actor at different times and each may take focus or both maybe present.

An important point to note is that the episodic concept of time applied by Lawrence et al. (2001) is that of social event time, which concords with the concepts of process (Pettigrew 1997), relational time (Halinen and Törnroos 1995) and also with flow time (Halinen et al. 2012). However, in systemic contexts the time that counts is effectively that of the institutional actor. Thus, at these times when the institutional actor operates systemically they appear to the subject as an environment (See Medlin (2004) on this distinction).

To conclude institutional actors undertake two types of activities: (1) influence when they interact with a firm and (2) discipline when they are required to treat the firm in a systemic manner.

THEORETICAL FRAMEWORK

In this section the focus is on the individual and the firm as the main actors in a network of firms. The network is enacted, in the sense that the firm has developed and advanced specific business relationships. Meanwhile institutions are entities within the social structure. Thus there are two networks: (1) the social institutional network and (2) the firm network, both interacting in a human-based concept of time flow. This means two levels of flowing network: (1) the macro-network of institutions and (2) the micro-network of firms. The macro-network is focused on social goals and regulations, while the micro- network is focused on firm specific and mutual economic outcomes. Wiley (1988) provides our meta-theoretical level framework, although the time component follows flow and period time (Halinen et al. 2012), rather than the historicist category of level nomenclature. Figure 1 presents the dynamic framework we apply.

Figure 1: Analysis levels and time in network legitimizing processes
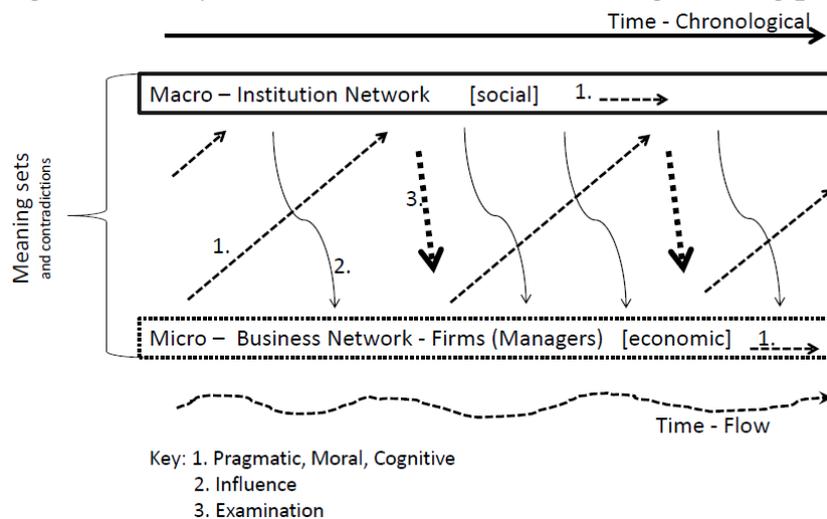
The macro-network includes all institutional (collective) actors (e.g. Universities, National Grant Bodies, State Development Departments etc.). The macro-network is driven by social goals. Thus, there is considerable stability in the macro-network timeline. Collective actors usually have annual and three or five year timelines. The collective nature means that changing direction is more difficult.

The micro-network is driven by specific and self-interest and also by anticipated mutual value outcomes (mainly economic). These actors pursue more their own and jointly related economic goals, although always aligned to social goals. Thus, timeline of the micro-network is composed of shorter periods, often interrupted and changing, as the firms continually adjust to the business network. The actors in the micro-network feel the intensity and momentum of time as they struggle to achieve their outcomes.

For the collective actor the focus of activity within the micro-network is on influence to trigger and guide firms to work towards outcomes that also meet the specific social goals for

which the institution has legitimacy. At other times the collective actor operates examination activities to ensure compliance by a firm. Together these two sets of activities enable the social actor to build legitimacy through one of the three bases according to who is the audience.

For the firm the focus of activity is within the micro-network so as to influence their legitimacy with other local actors through the three bases (Persson et al. 2011). This allows the focal firm to attract resources and partners to achieve an outcome. This outcome to some degree serves the specific and mutual interests of the firm, while also contributing towards the collective interest by meeting a specific social goal of any important collective actors in the macro-net. This is apparent for example when seeking finance, more connected firms with strong network position have greater legitimacy and access to funding.

These processes work together, the firm can build legitimacy by interacting with an institutional actor, and that interaction further builds the legitimacy of the collective actor. This forms a 'give and take' situation for the context where the legitimizing process works between specific actors in the micro- and macro-networks, as well as within each network.

As time flows and the interactions reach a turning point, or some critical events change the current situation, new issues emerge. At this time new collective actors as well as firms need to be considered for fresh legitimizing processes. Some actors might be left from previous interactions and legitimizing processes and some may take on new roles. Bridges need to be built with new actors in the micro- and macro-network of corporate and institutional network actors.

Issues to note further in the network processes concerning legitimacy are:
1. The specific context and pace of change where actors are embedded in the network
2. The roles and positions of the actors of the micro- and the macro-network in relation to power and subject-object issues
3. The joint issues, including adaptations, which align the actors in creating potential legitimizing processes to develop and/or change.

Time dimensions

Noting previously the change-stability issue in network development we observe legitimizing through a dynamic network perspective. In noting this we apply the following issues in catching the legitimizing dynamics. First the notion of relational time, considering the existing past, present and future forms the temporal base (Halinen and Törnroos 1995). Second, we note the asymmetric concept in the flow of time (Adam 2000), in where an irregular flow thrives. Third, we use sequenced time periods or phases where specific events and interactions grasp legitimizing processes and changes at play (Ancona et al. 2001; Capaldo 2007). Our temporal dimension frames the approach enabling a rich and thick description of the emerging network through its legitimizing processes over time in context (Pettigrew 1997).

We have noted the role of history the current legitimacy of an actor or a network of connected actors. This makes a frame or base for further legitimizing processes for the future between the parties involved (See also Yang and Su 2014).

RESEARCH METHOD AND APPROACH

Understanding how firms in a network gain legitimacy is best undertaken by a case study method, because the essential research question is related to a many-sided phenomenon where the questions of "how?" "when?" and "what?" are central (Yin 2010). However, there is a specific problem in a case study method for capturing legitimacy, which "is an unobservable construct" (Tornikoski and Newbert 2007: 315). In a quantitative method the issue is resolved by using indicators and presuming that scores reflect or measure a latent or formative construct respectively (Wilcox et al. 2008). Our approach is similar, we follow Tornikoski and Newbert (2007) and presume legitimacy is present when we detect and observe a reasonable and relevant process with a social outcome, which is supported by situational narratives that capture the processes we follow in practice. The contextual setting, key actors and the process under scrutiny makes the approach constructivist and 'naturalistic' (Lincoln and Guba 1985; Polkinghorne 1995).

The following perspectives in a specific context enable a focus on legitimizing processes in a business network:
1. A network and business marketing perspective is used emphasizing the role of interaction as the key dynamic factor.
2. As a consequence a longitudinal and process perspective is applied for conducting the embedded case research.
3. The case is analyzed through qualitative interpretation over time focusing on the detection and analysis of legitimization processes in intra- and extranet empirical relationships.
4. Theorizing is achieved by connecting empirical intra- and extranet and phase analysis to theoretical framework constructs: micro- and macronetwork and period. Attention to these distinctions is important in constructing the case as a theoretical tool. The case is a re-constructed perspective of empirical data undertaken by the researcher, who must note an empirical versus theoretical categorization of events.

In essence we are dealing with change and processes as they unfold over time in an irregular manner (Adam 2000). One issue deals with the role of legitimacy for those firms and actors that are trying to get a legitimate *position* in the eyes of other connected financial, research, regional and business actors. The other issue is how legitimizing actors build and maintain their role in wider society.

A process-based approach and method

A critical concern of our methodology is unfolding the legitimizing processes. The first concern is the level of analysis, between both intra- and extra-net positioned actors, and also within each network. Second, as we proceed, we use the embeddedness notion at each of the phases we are analyzing to understand the legitimizing processes at play. A further notion is that at different phases some actors are in the forefront and some others in the background. Those in the background may come forward in later processes for continuing legitimization when one hurdle is overcome. Fourth, the industry of embedded actors is reframing the relevant institutional environment and also actors in the intr-net.

Case selection - Biofuel

Our framework and methodological considerations lead us to conduct a case study of an emerging firm (Biofuel), which has been sustained by a number of Research and

Development grants, as well as commercial development grants, from entities within the Australian Federal Government. Biofuel originally began from the academic interests of two university researchers. Presently Biofuel seeks financing to undertake the first commercial test of their different propriety capabilities and intellectual property. The case study allows construction and positioning of firms and institutional actors within our theoretical framework. We have followed the activities of the researchers and Biofuel since 2007 until the present, and conducted multiple interviews (see Table 1).

Table 1: Individual and organizational actors

Individuals *	Their organization *	Interviews
SG	Professor, Energy Research Center, University of Australis	6 September 2011
DL (PhD civil engineering)	Professor, University of Australis Also employed by Biofuel Pty Ltd	12 December 2012 20 February 2012 29 January 2013 12 February 2013 11 March 2014 29 December 2014
MP An internationally known algae expert.	Professor of Marine Phycology and Director of an Algae R&D Center at Western University.	8 August 2012
GR	CEO of Biofuel Pty. Ltd. Joint Venture CEO of AOC Pty Ltd (a major shareholder of Biofuel)	20 February 2012 12 February 2013
PA (PhD energy applications)	Professor, University of Australis	10 May 2012
OC	Board Chairman, AOC Pty Ltd	13 February 2013
	BAN, major shareholder of AOC Pty Ltd	Secondary data
Mr. Smith (Mayor)	Coppermania City Council (CCC)	Secondary data
	Coppermania City Economic Development Department (CCEDD)	Secondary data
	Australian Renewable Energy Agency	Secondary data
	Northern Australia mining firm with power plant (WAP)	Secondary data
	Global Centrifuge company	Secondary data
	Local Catalytic company	Secondary data
	Japanese firm	29 January 2013
	BAL, a multi-national industrial firm	29 December 2014
* Fictitious names		

CASE STUDY

Sustainable production and marketing of biofuels is a global issue for mankind. Nation states, research institutions and financiers, the energy sector actors, environmental groups and regulatory bodies form some key groups.

Biofuel is an Australian R&D firm, which initially developed from the thoughts of two researchers, and then brought together many other private firms, individual researchers and government and public institutional actors seeking to commercialize the manufacturing process for producing crude oil from algae. Here we present the interactions between the firms and institutional actors in each of the five periods to date. Periods 1-2 are historically reconstructed from the interviews made in 2011 and 2012. The final commercialization period, period 6, is still some five years away.

Table 2: Biofuel's emerging objectives and network actors by period

Period*	Objective/s of key actors	Timeline
1 Two researchers in an emerging network	Application for funding from the Asian Pacific APP scheme (not successful)	2007
2 An extended research network	Second application for Asian Pacific APP scheme (successful)	2008
3 The network for fitting and testing the separate technologies	Test a pilot plant in an outdoor, open-air environment	2009 – late 2013 (Periods 3 and 4 overlap)
4 Preparing a major grant for testing the technology	Prepare a grant application for the Australian Renewable Energy Agency in conjunction with AOC Pty Ltd.	2012 – February 2013
5 Building and operating a demonstration plant	Test a demonstration plant at Coppermania. Plant not fully integrated	2013 – 2014 **Current period**
6 Proposed commercial plant	Build a commercial size and fully integrated plant.	Proposed 2019

Over the longer period rises in oil prices and uncertainty of secure supply suggest that alternate energy sources are required. Growing algae for biofuel has a low environmental footprint and less greenhouse gas emission. There is a societal interest in moving to a low carbon economy and as well as a public and State interest in developing new technologies to promulgate economic growth. Making fuel from algae is an agricultural and industrial process taking five steps: (1) grow algae in salt water with an input of recycled organic waste, (2) concentrate the algae and remove water, (3) convert the algae to a crude oil precursor with a catalytic converter, (4) extract the crude oil, and (5) fractionate into fuel products.

Period 1 – Two researchers

The development began at Australis University when DL and PA, two researchers, looked at new publication opportunities. DL had an interest in algae production and PA was researching new forms of energy production. An existing energy cluster at the university formed the site of the project and some research funding was given to the project.

> *"We were just picking up what other people were doing and we were quite happy to get on the bandwagon with everybody else." (PA interview 10 May 2012)*

DL began attending relevant conferences. Other attendees included algae and engineering researchers, bio-technicians, gene researchers, oil company representatives, energy firms, and refinery representatives. *".. there was a group in America also set up to look at carbon dioxide reduction, ... a workshop at Berkeley, invitation only." (DL, 12 December 2011)* The conference delegates concluded that making fuel from alga was possible, but a successful process would need to be competitive with fossil fuels.

The two researchers were scanning funding possibilities for their research. The researchers decided to write an application for funding from the Asia-Pacific Partnership on Clean Development and Climate, (the Asian Pacific APP scheme). This voluntary scheme was an international, public-private partnership among seven countries of the Association of South East Asian Nations (ASEAN) launched in 2006 and closed in 2011. The countries agreed to

co-operate on the development and transfer of technology to reduce greenhouse gas emissions, in line with the UN Framework Convention on Climate Change. The Australian Government allocated $33 million for the years 2008-2009.

The APP application required meeting specific technology development criteria as well engaging with private firms. The application was unsuccessful, but it had alerted other actors to the researchers' interests. Feedback was given that they needed more expertise in algae cultivars and also that they would need a stronger set of industry partners.

Period 2 –Research network

The researchers attracted MP, a Professor of Marine Phycology and Director of an Algae R&D Center at Western University. This new relationship resolved the need to have expertise in algae cultivars. DL began talking with AOC, a private Australian firm that had been researching biofuel from freshwater algae for some years. AOC had strongly developed industry and political connections.

During this period the consultant from the APP scheme approached the three researchers again, asking if they intended to submit a new grant application. MP's role was important in the new application, as his relationships lead to promises from WAP of "*land for free, accommodation and also they had a brand new gas-fired power station being built and they said we can use carbon dioxide from the stack, so there were all these extras, without giving us cash and that was great.*" (DL, 12 December 2011)

This time the grant was successful and "*it was fantastic because we knew we had the money to build a pilot plant, but being the type of funding it was we had very challenging milestones to achieve. (DL, 12 December 2011)*

Period 3 –Research

DL now brings AOC into the project. *"AOC joined and they said "we will put half a million dollars cash into the project on the proviso we form a company." (DL, 12 December 2011)* Biofuel is formed as a company with shareholding by AOC, Western University and Australis University.

The pilot plant is operated successfully in northern Western Australia. *"We had some intense R&D activities, we had to meet some goals with productivity, costs of production, etc., to be confident enough to continue with the business, so it was fairly critical. So that was on, really, recycling as much substrate as possible in growing the biomass to try and reduce costs. We also converted the biomass into bio-crude." (DL, 12 February 2013)*

Consideration was given to the technical issue of separating large quantities of water from the algae. *"To concentrate the algae, remove the water, we've been looking at the technology from Global Centrifuge - that company is at about the same stage of development as people like us, so their proven technology is the right scale for our demonstration plant. (DL, 11 March 2014)*

The researchers continuously scanned the environment and talked with possible future actors. *"We are more interested in jet fuel. Interestingly two weeks ago Virgin Australia announced that by 2020 they want five percent of their fuel to be from sustainable sources, ... we're saying to the end users, we need you to invest in infrastructure to convert the oil." (DL, 12 December 2011)*

Period 4 - Preparing a major grant

Periods 3 and 4 overlap in time, but we present them separately because there are different objectives. In period three the objective was to test a pilot plan in the open air in northern Australia. In period four the objective was to prepare a grant to win funds for a plant to demonstrate commercial viability.

Writing the application for the Australian Renewable Energy Agency (ARENA) grant was a joint effort with AOC. New institutional partners were needed, one's willing to provide structural support. *"We went over there, met the council, scoped Coppermania basically and realized it was a definite place to go. It was a region where they want to grow, they want new industry, they want innovation, it's in the Coppermania City Council's vision, renewables are part of their plan." (DL, 11 March 2014)*

ARENA is an Australian Federal government legislated expenditure of AU$2.5 billion to fund technologies in the renewable energy space through to 2022 (ARENA 2014). The purpose of ARENA is strengthen the commercial viability of the firms holding intellectual property by providing funds for R&D.

Talks are well underway with the Global Centrifuge and the Local Catalytic companies; both these firms are beginning to undertake R&D aligned to the future needs of Biofuel and AOC. Biofuel wins a new APP grant.

Period 5 - Building and operating a demonstration plant

The commercialization feasibility plant is opened at Coppermania. *"Basically this is the smallest you could make it to demonstrate the technology for investors. This is a 3.3 million dollar investment. And 6 months ago it looked like a paddock." (DL, 26 March 2014)*

The plant comprises technologies from a number of other firms, and new capital equipment installed by local firms under contract. Other actors are important in providing complementary technologies. Global Centrifuge, who operate in mixed water biomass applications, develop and install a centrifuge able to manage a throughput of 200,000 liters per day. Local Catalytic, an R&D firm, jointly develop with AOC their catalytic technology for continuous conversion of algae to kerogen. AOC and Local Catalytic have separate and joined patents on different parts of the technology. The next 12 months will see the completion of the feasibility study stage. This required reporting back to ARENA.

"basically we were under pressure to complete the construction and commissioning of our plant by June 30 because that was our go, no-go decision time, and part of that milestone report [to ARENA] *requires a life cycle assessment* (LCA) *for that part for the carbon footprint. ... we engaged the University of NA, they did the LCA for us as the third party. ... so we passed that" (DL, 29 December 2014)*

"People in Canberra are doing a milestone, a major report due in February. ... the idea of the grant was to make our company investment ready and we pretty much are investment ready." (DL, 29 December 2014)

The Local and Federal Government ministers have been visiting the plant. There has also been interest from large Multi-National energy companies (BAL and a Japanese firm).

Period 6 – Funding the first commercial plant

AOC is now exploring funding for their first commercial plant. *"They* [BAN] *own the shares so they have a choice: they can either say, "We can invest in" - and they have the ability, ... or they will change their shareholding agreement so a new party can step in." (DL, 11 March 2014)*

Building a fully automated and continuous processing commercial plant will take a lot of planning. It will take many years to gain the land, even if planning is commenced now. *"We are sounding out people we should talk to, to access large tracts of non-agricultural land. We are sounding out investors: what is driving them to be interested in what we are doing? We are obviously working closely with government to say, "Okay, what hoops do we have to jump through?" It's one thing building a demonstration plant and it's another thing covering 1000 hectares in ponds. That has lots of implications. So we are always thinking about working on those aspects into the future." (DL, 11 March 2014)*

Other firms interested in applying the technology are also now being attracted. *"We've had several visits from ... multi-billion dollar companies that ... have the capability to check everybody up and ... fortunately for us we've been informed that they were most impressed by Biofuel because of our commercial focus, much less on R&D, and understood that our technology is quite advanced." (DL, 11 March 2014)* These potential customers of the technology are important to Biofuel's future.

"We're no longer a research project so there's a lot less funding from the Federal Government that we will be eligible for. ARENA's obviously had its own pressure for funding because of the change of Government. So we are really looking at private investment to keep us going. ... Business as usual to operate the plant, to firm up the business case, for major investment." (DL, 29 December 2014)

But the oil price has now dropped significantly. *"Now we know that if we were just banking on oil from algae we would close the shop. An investor is not going to give you money. So we have to look alternative uses for the biomass, the algae biomass which we had been doing. So we do, we have got some eyes and ears on where to sell it and because of the technology we have developed and are developing, we still want to produce crude oil because we can. (DL, 29 December 2014)*

"We've also realised that having great technology we can negotiate several sales of technology in Japan, India and the US so that also another way of organizing some cash flow." (DL, 29 December 2014)

"BAL, its a big company, multi-billion dollar company are interested in our hydro thermal liquefaction. ... and they said "Our reactor has the highest throughput per tube that they had ever seen". And as far as they are concerned it is world-leading technology. ... if the data looks good, ... then we will work out how we are going to work together." (DL, 29 December 2014)

ANALYSIS

In this section we first describe how we capture a dynamic perspective, and then we present the results of analysis on legitimacy processes. First, Table 3 shows the constructed periods in

analyzing the key processes and legitimizing issues during the diverse phases of network emergence and change. We pinpoint the time flow-issue in the legitimizing process and for analytical reasons we delineated them into specific relevant periods. The periods made are based on interpretation of the data, as it emerges and has changed, with each composed as interactions of a process towards an outcome. This approach enabled us to find fundamental change phases that transcends one period into another, when novel circumstances change a current course of action and interactions into another. The table shows through these 6 stages how legitimization is "earned" as an outcome of the interactions between actors in the micro- and macro-network.

Table Three. Intra-extranet legitimizing processes in the Biofuel case

Period*	Objective/s	Legitimizing
1 Two researchers in an emerging network	Application for funding from the Asian Pacific APP scheme (not successful)	2007 Intranet: 2 researchers acting in the University Extranet: APP (consultant), Australis Uni, and Western Uni *Legitimizing process started*
2 An extended research network	Second application for Asian Pacific (APP) scheme (successful)	2008 Intranet: Firm actors - AOC, WAP, 3 researchers Extranet: APP Institutional actor *Legitimizing evidence – success with grant*
3 The network for fitting and testing the separate technologies	Test a pilot plant in an outdoor, open-air environment	2009 – late 2013 (Periods 3 and 4 overlap) Intranet: Firm actors - Biofuel, AOC, BAN, WAP, 3 researchers Extranet: APP Institutional actor *Legitimizing evidence – success with outdoor algae growth in all seasons. Converted biomass to bio-crude.*
4 Preparing a major grant for testing the technology	Prepare a grant application for the Australian Renewable Energy Agency (ARENA) in conjunction with AOC Pty Ltd.	2012 – February 2013 Intranet: Firm actors - Biofuel, AOC, BAN, multiple researchers Extranet: ARENA Institutional actor, Coppermania Council *Legitimizing evidence – grant success with Australian Renewable Energy Agency*
5 Building and operating a demonstration plant	Test a demonstration plant at Coppermania. Plant not fully integrated	2013 – 2014 Current period Intranet: Firm actors - Biofuel, AOC, BAN, multiple researchers Extranet: ARENA Institutional actor, Coppermania Council, Local and Federal Government *Legitimizing evidence – 1. Success in building a commercial test facility, 2. Success in completion of a carbon footprint Life Cycle Assessment, 3. Multiple patents gained, 4. Recognition of world class reactor technology*
6 Proposed commercial plant	Build a commercial size and fully integrated plant.	Proposed 2019 Intranet: Firm actors - Biofuel, AOC, BAN, multiple researchers, Financing firms, etc. Extranet: Coppermania Council, State Development office, *Legitimizing evidence – yet to achieve*

Second, the analysis also unfolds the flow dimensions of the longitudinal process (Halinen et al. 2012) and a history from the start. Apparent is the irregular flow of time through the phases (Adam 2000). As the situation changes and new issues or events are taken to the fore new processes need to be activated or the pace of change can be stalled. From Table 3, there is a progression of outcomes providing legitimization, with each social outcome providing a

new context for another step forward into a future.

Third, the analysis shows the three dimensions of legitimizing processes at play as actors in the micro-network interact:
  (i)   The pragmatic dimension (e.g. by getting funding, and research support from the Universities (extra-net) and finding a network-technology fit, and acceptance from partners (micro-net).
  (ii)   The moral dimension (e.g. by being accepted for doing the right thing in society (extra-net) and for connected business partners (micro-net),
  (iii)   The cognitive dimension (i.e. actor's individual belief of having a legitimate position and trust for the future). These last elements are clearly detected through the utterances and narratives of the interviews with key informants.

Thus, a time sequence analysis displays the following processes at a theoretical level. The focal actor is given legitimacy through the processes of influence and then examination by an actor in the macro-network (gaining the grants, i.e. APP, ARENA). Next the focal actor develops legitimacy within their micro-network, by attracting other actors on the basis of legitimacy from the macro-network actor, and then interacting to achieve particular outcomes. These outcomes build legitimacy from other actors in the micro-network (e.g. Japanese firm, BAL) and also in the macro-network (e.g. ARENA, politicians). Figure 2 shows these connected legitimizing processes. In this particular case the sequence, simplified, is as follows: 1b, 1a, 2.b, 2.a, 1.b, 3.a, 3.b, 3.c. What is evident is that sequences of resource use and outcomes are recognized and result in new interactions which formalize understandings in the social sphere. These formalized understandings lead to new activities, which indicate a social legitimacy is bestowed upon an actor. Here the we do not mean trust, as that is between actors; rather the legitimacy is in the face of the social understanding between many actors (see Persson et al. 2011)

Figure 2: Legitimacy processes
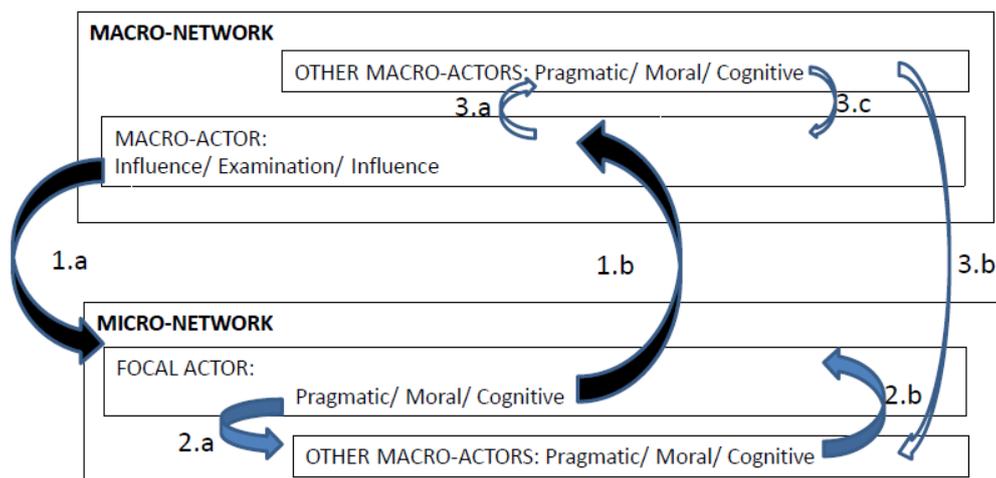
Key: Numbers indicate a process of connected interactions, not a sequence.
Intensity displayed by darkness of arrow.

Third, legitimacy arises in part as the process of interaction proceeds, and then is given or not when an outcome is socially presented. The degree of social recognition can be between two firms in the micro-network (e.g. between Biofuel and BAL), or more public when given by an actor in the macro-network (e.g. AREANA and Biofuel versus a Politician and Biofuel).

In any case legitimacy is only known by a social act. This complies with the notion that legitimacy itself is unobservable and can only be implied (Tornikoski and Newbert 2007).

CONCLUSIONS AND IMPLICATIONS

Our analysis notes three key elements of the legitimizing processes:
1. Legitimacy building is an interactive process between firms and collective actors, in constant emergence and change.
2. The three bases for legitimacy (pragmatic, moral, cognitive) are present in our case and they provide justification and social rationalization for ideas and beliefs.
3. Legitimacy is an evaluation of external audiences, but is unobservable and only can be implied.

Theoretical implications

This study opens a number of interesting theoretical issues to explore. We can see that theorizing about time and improving case method with regard to a clear understanding of time elements is an essential work. Second, the concept of actor and legitimacy processes is interactive with other actors, and this deserves further attention. Third, there is a need to undertake further work on the nature of different collective actors. We discuss these three areas in greater depth.

First, one cannot theorize about a process without explicitly accounting for time, and the dynamic of time, as these concepts construct the notions of change and interaction (Medlin 2004). The use of a time and the critical temporal dimension relates to the interactive dimension of both the networking and legitimizing processes. Based on the presentation in Figure 2 we find some general conceptual comments to be made when the conceptual is confronted with our empirical analysis:

- The interactive flow in network legitimation processes unfolds through a number of emerging periods where both micro-net and macro-net relationships are built. Nexuses of change thrive when the process moves from one reality and fulfillment stage to another, followed by new processes of intentions and sensemaking, and then interactions and legitimization processes.
- The irregular flow of time in the process could be seen to materialize in the nexus from one situation to another. In this change-period actors are actively seeking for new business partners and simultaneously building up relationships to new institutional actors (e.g. in period 3-4, planning for the test plant in a new area and preparing for new grants from novel institutional funds). These change situations start new intra and extra networks and interactions and legitimizing processes

Thus, we suggest further research on time phases, periods, sequences, and especially by also applying empirical settings where different times can be re-constructed, or are found. The human nature of time, like legitimacy, is somewhat un-observable; but this also means a rich research ground.

Second, the double-sidedness of legitimization processes deserves further research attention. In particular we call for an understanding of how change processes prevail in a dynamic networking context to capture the on-going double-sidedness of resource interaction and social processes between micro-network and macro-network actors. For example, the stability issue in legitimacy and institutionalization (Dacin et al. 2002) is an artifact of the fairly

established societal rules and regulations that form a frame for the macro-network. Influence, examination and control are in the end based on state power, which is also an institutional phenomenon. That a macro-network actor can carry out these processes relies on the legitimacy they provide to other institutions and vice-versa (see Figure 2). Thus, all institutionalized entities are not static, but always becoming. The processes of constantly legitimizing deserve further research.

Third, the question of how to conceptualize an actor remains a moot issue. Evidently in a processual view an actor is always a collective entity: even an individual does not act alone. The idea that an entrepreneur creates a business from their own idea and resources is evidently a myth (Shaver 1995). Thus, there are only collective actors. But what does that mean with regard to capturing the many sidedness of actor? One can look at the issue from outside-in or inside-out. For example an individual as a manager is a specific form of collective actor who acts in a joined fashion with others and so one must think about conceptual boundaries. Alternately, the social or economic network constrains and enables the activities of the firm and the manager, and so again there are conceptual boundaries. In theory each actor has many boundaries to deal with and many other actors with whom to connect. How then to decide? Our tools remain the same: clear thoughts about our research problem, humanity, time, space, network connection, and choices between futures.

Managerial implications

In developing business relationships and networks an actor firm must relate to other actors in its strategy. Creating a role and position in an embedded network of actors as it emerges is a key factor to gaining and maintaining legitimacy. The local micro-net is by necessity related to institutions in society, both by social meaning and especially by granting access to resources. As a result there is a need for firms to align with rules, regulations and norms in order to find and maintain a legitimate status. This is a continuous but often "invisible" process that needs to be considered in strategy.

The intranet versus extranet distinction and how each is embedded in the wider network seems a useful tool for managers to understand and apply to discussions about not only legitimacy, but also strategic and resource issues. Considering the different mode of operation by actors in the extra-net, seeking social goals, opens some clarity in strategic thing. Also thinking about institutional actors as connected, rather than in the environment, by using the extra-net and intra-net ideas opens the way to strategic choices on the one hand; but also to means for collaboration through resolving conflicts.

The business context and processes at play in the intra and extra net form the framework for interacting. But to comprehend the interactions and where they are going into specific futures also requires learning from history. Institutions are in constant change, as are firms, so the processes of building legitimization are continuous. The dynamic framework provided in this paper offers a way to capture and comprehend these social changes related to economic resources and our social futures.

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