Measuring Emergence in the Dynamics of New Venture Creation

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Measuring emergence in the dynamics of new venture creation

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Abstract

Modeling the dynamics of nascent entrepreneurship provides insight into how organizations are created. In order to study this complex phenomenon we develop a longitudinal case study and analyze it with respect to three modes of organizing: vision, strategic organizing, and tactical organizing. Multiple sources of data are used to identify changes within and across these three modes. Using longitudinal content analysis and other complexity science methods, we found a nearly simultaneous shift in all three modes, indicating a punctuation event. We define this punctuation as an "emergence event," and provide a process model of organizational emergence showing that a shift in tactical organizing generated a shift in strategic organizing, which resulted in a shift in the vision (identity) of the firm. We conclude with some theoretical implications of our analysis.
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1. Executive summary

Dynamic processes are at the core of organizational emergence. Understanding these dynamics is particularly challenging because new venture creation involves multiple modes of activity that occur simultaneously and interdependently over time (Low and MacMillan, 1988). In order to capture this complex phenomenon, the present study employed a research design using innovative procedures and multiple data sources. The study addressed the research question: How do different modes of organizing change in organizational emergence? We assumed that change is pervasive in entrepreneurial dynamics (Stevenson and Harmeling, 1990) and thus sought to identify how and when modes of organizing undergo change.

Due to the lack of well-established theory, we explored the research question using a single, in-depth case study (HealthInfo). A nascent entrepreneur was interviewed every 2 weeks for two years. Interviews were transcribed and analyzed using both manifest (Corman et al. 2002) and latent (Van de Ven et al., 1989) content analysis. Quantitative data resulting from these content analyses were then visualized and analyzed using multivariate and time series methods (Poole et al., 2000).

We identified three different modes of organizing: vision, strategic organizing, and tactical organizing. The first mode focused on the business opportunity the entrepreneur was hoping to capitalize on, and the concept she was organizing around. We studied this mode by analyzing the interview transcripts via manifest content analysis, which identified the most significant concepts in a text and how they related to one another. The second mode, strategic organizing, concerned the stream of decisions, actions and interventions enacted by the entrepreneur. These "organizing moves" were identified within the interview transcripts and latently coded according to four different categories of activity: "Total Organizing Moves," "Strategic Decisions," "Job Distractions," and "Personal Investment." The subsequent quantitative data (the number of activities in a particular category within a fixed time period) were analyzed using time series analysis in order to determine if there were any points in time when the behavior of the time series changed in a significant manner, indicating a punctuated change in strategic organizing. The third mode of organizing, tactical organizing, involved identifying the time in which particular events indicative of an entrepreneurial start-up occurred (Reynolds, 2000). The rate of start-up activity was also analyzed for change points via time series analysis.

All the different data sources, being analyzed using different methods, pointed to a common change point. Specifically, the manifest content analysis revealed the emergence of a new organizing vision for the venture; the event time series analysis revealed a nearly instantaneous change in strategic organizing; and the time series analysis of start-up activities revealed a punctuated shift in tactical organizing.

We labeled this simultaneous shift in organizing modes an "emergence event." An emergence event is a punctuated, coordinated shift in multiple modes of entrepreneurial organizing at virtually the same time, which generates a qualitatively different state–a new identity–within the nascent venture. In this case we found the emergence event to coincide in time with the legal incorporation of HealthUSA, a qualitatively novel entity that transcended yet included the original HealthInfo business concept. Furthermore,

we found that within the HealthInfo emergence event, a particular sequence of change occurred in the organizing modes: behavior (tactics) preceded decisions (strategy), which preceded goals (vision). The HealthInfo case offers an opportunity for new theorizing about emergence, specifically in the sequence and dynamics of nascent entrepreneurship and new venture creation.

2. Introduction

Dynamics is at the core of entrepreneurship. Starting from Schumpeter's (1934) definition of entrepreneurship as discontinuous change that destroys an economic equilibrium, researchers have explored the dynamics of entrepreneurship in terms of opportunity recognition (Hills et al., 1999; Sarasvathy, 2001a; Shane and Venkataraman, 2000), corporate innovation and new product development (Deeds et al., 2000; Van de Ven et al., 1999), organizational birth and evolution (Aldrich, 1999; Bhide, 2000), and the growth of new and small organizations (Greiner, 1972; Hanks et al., 1994).

While the emergence of new firms has been studied extensively at the level of a market (Schoonhoven and Romanelli, 2000), it has been studied much more sparingly at the level of the firm, or the entrepreneur (Carter et al., 1996; Gartner, 1993; Katz and Gartner, 1988). The study of organizational emergence at more micro-levels is challenging for several reasons. First, the process of new venture creation can span decades (Gartner and Carter, 2003), thus any research design must employ longitudinal data collection and analyses. Second, new venture creation is characterized by multiple modes of activity that occur simultaneously and interdependently (Low and MacMillan, 1988). These multiple modes require multiple data sources to be examined. Although any complete understanding of organizational emergence requires an analysis of interactions between modes and across levels (Bygrave, 1989; Gartner, 2001), few studies of new venture creation have examined more than one level or mode of analysis over time (Davidsson and Wiklund, 2001), and fewer still have explored interactions and influences across levels or modes. These methodological challenges are common in entrepreneurship research: in their 10-year analysis of all entrepreneurship articles published in top-tier management journals,[3] Chandler and Lyon (2001) found that just 11% employed multi-level or cross-level designs, and less than 7% employed non-retrospective longitudinal methods. Fewer than 0.5 % of the studies employed both.

One reason for the lack of multi-level or multi-modal longitudinal research may be the lack of methods available for rigorously analyzing these types of data. This problem is highlighted in Chandler and Lyon's (2001: 108) listing of analytic techniques utilized by entrepreneurship researchers. None of the 416 articles utilized any quantitative methods specifically designed for longitudinal, relational, and/or time series data. Such methods are less familiar to social science researchers (Bradbury and Lichtenstein, 2000) and they tend to be time-consuming and difficult to apply (Poole et al., 2000; Van de Ven, 1992).

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[3] They coded 416 articles that appeared in ET and P, JBV, SMJ, AMJ, AMR, Organization Science, Management Science, JOM, or ASQ between 1989 and 1999.

However, just as dynamical processes are central to a rich understanding of entrepreneurship (Bygrave and Hofer, 1991), research methods that can capture and analyze these dynamics have become a cornerstone for advancing entrepreneurship research (Aldrich and Martinez, 2001; Davidsson et al., 2001). Although researchers are being called to utilize techniques that can capture the subtleties of dynamic processes and events (Hoang and Antoncic, 2003; McKelvey, 2004), few entrepreneurship studies exist that describe specific methods for doing so.

The present study accomplishes that goal, by applying several innovative procedures and methods to the exploration of new venture creation dynamics. We first describe how data was collected concerning entrepreneurial activity and sensemaking. Latent and manifest content analysis is used in conjunction with time series analysis to characterize process dynamics. Results reveal an "emergence event" in new venture creation, a punctuated change event defined by coordinated transformations in tactics, strategy, and vision. We compare this process model with other process theories concerning organizational emergence.

3. Research methods

3.1. The HealthInfo case study

Exploratory case study research is the design recommended for studying phenomena that are subtle and/or poorly understood (Eisenhardt, 1989; Miles and Huberman, 1994). A single case study can provide deeper insights than other research designs (March et al., 1991), and such an immersion is particularly important when studying complex and dynamic phenomenon like organizational emergence (Gartner, 1993; Moustakes, 1990). By focusing on accuracy and validity rather than generalizeability (Yin, 1984), a single case provides the foundation for theory-generation, which can then be more rigorously explored using a multiple-case replication logic (Eisenhardt, 1989; Van de Ven et al., 1989).

In fact, the opportunity for pursuing this research involved a serendipitous meeting with an entrepreneur who was just at the beginning of creating her venture. This individual was committed to starting a venture providing information and services to health-conscious adults—we use the pseudonym "HealthInfo." After hearing about our research interests, and as we learned enough about her business concept to know it had viability, we asked her to participate in our study, and she agreed. Thus, data was collected from the inception of her organizing, i.e. her origin as a "nascent entrepreneur" (Carter et al., 1996).

4. Data collection

We assumed that more frequent data collection would yield not only more data, but also a better picture of the dynamics of the system (Monge, 1990). Previous longitudinal studies in entrepreneurship have utilized a repeated interview design, but those interviews were taken every 6 months (Eisenhardt, 1989; Gersick, 1994; Van de Ven et al., 1989) or year (Carter et al., 1996; Reynolds, 2000). Ethnographic methods resolve this through

nearly continuous observation (Pentland, 1992), but these procedures have only been employed within existing organizations (e.g. Barley, 1986) where the invasiveness of the procedure is tolerable (Barley, 1990). In order to balance the issues of sampling frequency and entrepreneur availability, we collected interview data semi-weekly over a period of 2 years.

Given the lack of a consistent theoretical framework for new venture creation, we wanted to collect data in as open a manner as possible. At the same time, we wished to be sensitive to the notion that if we only inquired about what had happened in a retrospective manner, that various biases of retrospection could overwhelm the data. Thus, we asked a question about organizing that was as projective as possible, focusing on the nascent entrepreneur's current and future plans:

> "What's going on with HealthInfo—what are you focused on organizing this week, and what do you want to be organizing over the next two weeks?

4.1. Organizing the case study data

Thirty-two interviews were transcribed and content analyzed for the current study. The end-date was chosen as a natural point of "theoretical saturation" (Miles and Huberman, 1994). The entrepreneur had legally incorporated the firm around interview #18; thus, the sample frame contained about equal amounts of data before and after this specific outcome.

The case is organized in terms of "Data Collection Periods" [DCP], which occur every 2 weeks from December, 1998 through March, 2001. In addition to the qualitative data, we also collected numerous secondary data, including all the expenses logged by the entrepreneur, successive iterations of her product prototype, all marketing materials she produced, and so on. Interview texts are referred to as DCP 1 through DCP 32. Following prescriptions from Miles and Huberman (1994) we organized the data longitudinally by combining all the data relevant to each DCP in one place, before submitting it to our analyses. The DCP represents our unit of analysis, and thus the 32 DCPs represent our sampling frame. Note that the unit of analysis is different from the level of analysis. The unit of analysis refers to how data is aggregated and subsequently analyzed, while the level of analysis refers to the scope of the phenomena being studied.

For reliability purposes, interviews were transcribed and checked by two researchers. Validity was enhanced throughout the case by sharing certain raw and coded data with the entrepreneur (Erlandson et al., 1993). The author performing the quantitative content and time series analyses was otherwise made unaware of the details of the case, and was not told of the incorporation event, in order to remain unbiased in his analyses.

5. Preliminary analysis—three modes of organizing

Entrepreneurship scholars have long acknowledged the multi-level quality of new venture creation, and have specified up to six distinct levels of analysis that have been employed to explain the phenomenon, including the individual, the group-team, the

project/innovation, the firm, the industry, and the macro-environment (Chandler and Lyon, 2001; Davidsson and Wiklund, 2001; Low and MacMillan, 1988). In the case where the new venture is being driven by a single person, as in HealthInfo, some of these distinctions collapse. Our level of analysis is best described as being at the level of the firm. Our interest was not in analyzing attributes of the entrepreneur such as personality or decision-making style, but rather on the activities that she engaged in that led to firm creation, and her cognition and attitudes with respect to the creation of the firm.

Our case data captured many different elements that have been recognized as being important to organizational creation: cognition and cognitive change (Gatewood et al., 1995; Lowstedt, 1993), intention (Bird, 1988), elements of opportunity recognition and development (Ardichvili et al., 2003; Shane, 2000); individual organizing moves that spark emergence (Gartner, 1993; Gartner et al., 1992); various types of strategic organizing that occurs as the entrepreneur acquires and creates resources, gains legitimacy and innovates their product/service (Bhide, 2000; Greene et al., 1997), and specific start-up activities of nascent entrepreneurs that have been shown to lead to successful organizational emergence (Carter et al., 1996; Gartner and Carter, 2003).

In order to bring cohesion to the case data, the research team sorted through the data both independently and as a group, and found that the case data could effectively be framed according to three different "modes" of organizing: (1) Organizing the Vision; (2) Strategic Organizing; and (3) Tactical Organizing. In the following three sections we describe each of these modes of organizing, along with the analytic methods used to measure the dynamics of organizing within the mode.

6. Mode #1: "organizing the vision"—opportunity recognition

6.1. Opportunity recognition and a business concept

Starting with the very first interview, our nascent entrepreneur expressed a strong vision for her venture, and a distinct business concept that she believed would capitalize on the business opportunity she had recognized through her career as a consultant to the health and beauty industry. In the first interview she described her concept:

> The concept is a directory of healthy living resources for people who are traveling. So it's like a combination of a travel guide and a health guide... it would be useful to interesting diverse target markets. It also includes, and perhaps this is obvious, a web site. I've gone back and forth, do I launch the web site first, do I launch the book first, or do I use one to launch the other? But thinking of it as a web site made me focus on it as a business. ...And so, the question becomes how do I make money? This led to products. (She then describes a broad product line). *[DCP 1]*

Throughout the 32 DCPs she occasionally expressed her concerns about whether her organizing efforts remained aligned with her vision, and whether she was moving toward the business opportunity she had originally identified. In formal terms, these data refer to the process of opportunity recognition (Shane and Venkataraman, 2000), the development of a business model (Afula, 2004), and creation of a vision (Collins and

Porras, 1994). We combine these notions into the same mode, which we term "organizing vision."

In addition to doing an in-depth exploration of her opportunity recognition process, we wanted to capture any changes she might make in that opportunity through her overall organizing. Recent theory suggests that differences between the original concept and the one that actually emerges are likely in nascent entrepreneurship (de Koning, 1999; Hills et al., 1999) and in very young ventures (Nicholls-Nixen et al., 2000); some dynamics of those changes have been investigated by Sarasvathy (2001b) and by Ardichvili et al. (2003). We thus wanted a technique that would highlight the structure of her perceptions about the opportunity, and also one that would measure a shift in those perceptions over time.

6.2. Centering resonance analysis

In order to identify the entrepreneur's perceptions and potential changes in opportunity recognition, content analysis was performed on the text from the transcribed interviews. Content analysis seeks to interpret the meaning of text through systematic analysis of a text's content (Holsti, 1969). Content analysis has been used in numerous research studies to create process theory from the narratives of participants (Pentland, 1999). The particular content analysis method we used was "Centering Resonance Analysis" (CRA; Corman et al., 2002), which represents a text as a network of nodes (nouns and adjectives from the text) and connections between nodes that are indicative of word co-occurrences. CRA is particularly effective at picking up subtleties within discourse, which is important when using a text to imply the cognitive map of the author/speaker (McPhee et al., 2002). CRA measures the importance of individual words via a measure of word *influence*, which estimates how significant the word is in generating coherence within the discourse. A word's influence provides a measure of its importance; influence is only weakly correlated with its frequency (Corman et al., 2002). CRA also produces a measure of *resonance*, which estimates how similar two texts are in their content. CRA is described in more detail in Appendix A.

6.3. Emergence of a new vision for organizing

Centering Resonance Analysis was used to determine whether the entrepreneur's cognitive schema shifted at any time during the case study. The resonance (i.e. similarity) between each pair of texts was calculated, and we found that there were two interviews that had largest degree of resonance with each other: the first interview in December, 1998—DCP 1, and the interview on August 27th, 1999—DCP 19 (normalized resonance=0.40).

We interpret these results in the following manner. As DCP 1 is the first interview, its content was more general in nature. Whereas subsequent interviews focus attention on the future and on salient elements of the previous 2 weeks, the first interview encompasses all that came before it, and all that may follow it, in time. Being more general in nature however does not in itself generate high resonance; this fact can only be explained by there being some degree of similarity between what was discussed during the first interview and what was discussed in subsequent interviews. Such path dependency is a natural trait of a

complex system (Dooley and Van de Ven, 1999). Since the cognitive structure of DCP 1 revolves around the entrepreneur's initial vision and framing for her venture, the resonance in content between DCP 1 and DCP 19 suggests that the latter interview is also focused on (re)visioning the venture, (re)framing the opportunity for the business, and/or creating a new identify for the firm. This result suggests that the entrepreneur experienced a shift in opportunity and vision at this time—DCP 19.

We examine this assertion by looking at the content of DCP 19 and the interviews immediately surrounding it. Qualitative data from DCP 19 provide further evidence of a cognitive shift in the entrepreneur. As an example, she describes a change in her business values, reflected in the type of health-related content, from quantity of information to quality of information:

> I feel like I need to be more discriminating about what [information] I put in there. . .. I'm shifting from the urge to have quantity of information to. . .the need to have [really] good information. . . *[DCP 19]*

She also references a shift in momentum, in gaining critical mass in her organizing:

> I have got to cross this line; reach this threshold of activity, of critical mass, before I have anything to show anyone. And that's my aim. *[DCP 19]*

In the next interview she expresses a tangible shift in her perception and attitude about the venture, suddenly describing it as "a bright and shining star in the future." *[DCP 20]* Taking a much more long-term view she says:

> I still have a real strong enthusiasm for this. And I get excited about it. When I look at other [web] sites I think: I'm a contender. . . . I feel I have a good handle on everything in front of me. [But] it's not making me crazy anymore. *[DCP 20]*

These results point to a significant revisiting of opportunity recognition near the time of DCP 19. Was this a confirmation of the existing opportunity recognition, or a definitive shift? An aggregate text was formed of all interviews from DCP 1 to DCP 18, and a second aggregate text from interviews DCP 19 to DCP 32. Next, CRA networks were generated for each of the aggregate texts, and influential words were identified. The discursive network in epoch 1 (DCP 1–DCP 18) is organized around the influential concepts of *time* and *book*, whereas the discursive network in epoch 2 (DCP 19–DCP 32) is organized around the key concepts of *work*, *people*, and the emerging venture, *HealthInfo*. Further, three high influence words in epoch 1–*money*, *done*, and *great*–do not occur in epoch 2; similarly there are words that had high influence in epoch 2 but not in epoch 1: *question*, *kind*, *try*, and *e-commerce*. Thus, her discursive schema went from being focused on resources and objects (*money*, *time*, *book*) to issues of organizing (*HealthInfo*). There also was movement towards a more adaptive stance (*question*, *try*), and to a strategic interest in emerging technology (*e-commerce*) and how it might affect the company's products.

An important element of the second epoch is the self-organization of a new deep structure for the firm (Drazin and Sandelands, 1992), reflected in the formation of a legal entity. Surprisingly, however, the corporation represents a vision beyond the original

HealthInfo concept. The interviews around and after the change point [DCP 19] suggest the importance of this new entity, "HealthUSA," within which the original small business HealthInfo is but one of several interlocking businesses:

> First, it's the HealthInfo business, and beyond. The corporation is HealthUSA, which includes [multiple] different projects... I should say, they dovetail, but they include and are more than HealthInfo. *[DCP 18]*.

She enunciated the idea more clearly a few weeks later, where she explained this new entity named HealthUSA:

> HealthInfo is subsumed in my larger vision for which I have a lot of enthusiasm... I'm operating in a larger mode in which HealthInfo is a component and HealthUSA is the vision... Now I'm the HealthUSA executive. Before I was the HealthInfo-woman. Now I can delegate. *[DCP 22]*.

These data reveal that the entrepreneur has reinterpreted her organizing efforts by creating a corporate entity HealthUSA, with HealthInfo being one of the component businesses. HealthUSA is a broader, more encompassing business concept than HealthInfo; it re-contextualizes the business opportunity, along with her beliefs, her decisions, and her organizing activities (Lowstedt, 1993).

The birth of HealthUSA involves the creation of a qualitatively new level of order within her organizing, for a corporation with several member companies is a more encompassing business concept than just one of those companies alone. This sense of transcending yet including system components is a well-known definition of emergence from systems theory (Boulding, 1978; Koestler, 1979; Miller, 1978). Over time the entrepreneur became clearer about the new level of order that had emerged as HealthUSA. She used the metaphor of a flower to talk about the individual businesses (petals) and the corporation as a whole (whole flower). Moreover, within 2 weeks of the shift, the entrepreneur started talking about a new venture, parallel to HealthInfo, that she perceived could be easier to pull off in a short period of time. Although she did not pursue any organizing around that other business, her conversation exemplifies a new cognitive map: HealthInfo had become one of numerous potential project ventures within the HealthUSA business concept.

7. Mode #2: "strategic organizing"—patterns in a stream of decisions

As we examined the content of each of the interviews, we found that a significant amount of their content was reflective of "strategic organizing." The term strategic organizing references Mintzberg's (1978) observation that the strategic viability of a firm is secured through its "pattern in a stream of decisions" and actions. These data represented decisions and actions—tangible "moves" (Pentland, 1992) the entrepreneur made as she "organized" her business (Gartner, 1985). These "organizing moves" are tangible, situation-specific "mentionable events" (Pentland, 1992: 259) discovered within the interview transcripts.

7.1. Four categories of strategic organizing moves

The research team first identified the organizing moves indicated in the transcripts, and then sorted them into categories. Our final selection of categories was sensitive to the desire to capture categories of organizing moves that were present in virtually every interview, and thus were highly salient to the entrepreneur (Lichtenstein and Brush, 2001). These categories were then cross-checked by the entrepreneur to support their validity and meaningfulness (Erlandson et al., 1993). The four categories are *Total Organizing Moves*, *Strategic Decisions*, *Job Distractions*, and *Personal Investment*, and examples of each of the four categories are presented in Table 1.

Total Organizing Moves (TOTAL) simply refers to the complete (coded) set of decisions and actions that the entrepreneur described to us in each data collection period (every 2 weeks). *Strategic Decisions* (B/W) focus on the entrepreneur's ongoing question

Table 1
The four dimensions of HealthInfo's emerging configuration

Dimension	Examples from interviews		Coding into time series variables
Organizing moves	I took [my friends] out to dinner…Toward the end I told them about HealthInfo. They generally liked [the idea]. I tried various ways of formatting the book—I tried to use Microsoft Publisher. It was revealing and frustrating. I had a day or two of just doing Claris Home Page®, trying to design [a home page] for HealthInfo. I need to organize the information I already have.		Count of total Organizing Moves in each DCP=time series variable *TOTAL*
Book web	I identified a person who can talk about cover design, perhaps even do the design [for the whole book]. Do I need to be publishing this myself? Maybe first I just find a publisher. I'm narrowing my focus to the book itself. I'm just going to focus on the book. I'm carrying forward with the notion of putting this on the web. I'm going to prepare an RFP for web site development. And circulate it to three people. The web page is just so complicated and multi-layered, I just can't handle it right now.		Count actions related to Book [B] versus promoting a web product-focus [W]; the ratio was a metric, *B/W*; this metric was calculated for each DCP.
Job	I've got to get [consulting reports] out the door. So I spent two days crunching numbers. What will I do next? … I'm just so overwhelmed with other [work] projects. I've got these hurdles that are related to my career.		Count of all job-based responsibilities in each DCP= time series variable *JOB*
Expenses	From Excel Worksheet		Tally of all HealthInfo-related expenses=time series variable *EXPENSES*.
	Two weeks ending	Expenses	
	20-Dec-98	$0	
	03-Jan-99	$82.77	
	19-Jan-99	$277.56	
	03-Feb-99	$10.67	

about whether to publish her information as a book, or present it as a commercial web site. This decision was strategic in that its outcome defined whether the business was to be product-based versus service-based, which market it would enter and how, and the core activity systems that would need to be in place to generate income. Third, *Job Distractions* (JOB) refers to her ongoing project-based client responsibilities and other work obligations that took time and energy away from organizing her HealthInfo venture. Fourth, *Personal Investment* (EXPENSES) captures the financial resources the entrepreneur was putting into her start-up.

Together, we refer to these four categories as strategic organizing, that is, the stream of decisions, actions and interventions enacted by the entrepreneur as she translated her abstract vision and business concept into form in the face of day-to-day contingencies and challenges. Strategic organizing also references the fact that a large percentage of these organizing moves were directed at developing a resource base for building the entrepreneur's capabilities and resources (Brush et al., 2001; Dollinger, 1995).

7.2. Coding the categories into time series variables

In order to identify the patterns within each category of strategic organizing and to explore the dynamics across all four types, we employed the coding technique developed by Van de Ven and Poole (1990). Like their approach, we coded each organizing move into its category, and then counted the number of coded mentions in each category into a quantitative variable. These variables are then translated onto a master spreadsheet, where each row is one of the four categories and each column a data collection period; the overall result is a set of nearly continuous time series variables. Our coding translations are shown in Table 1.

7.3. Tracking changes in strategic organizing

In order to discover any significant shifts in strategic organizing, and attendant changes to the generative mechanisms that are thought to cause such shifts in strategic organizing, we used event time series analysis methods (Poole et al., 2000). In event time series analysis the temporal structure of a data set–in our case, the four coded time series variables that represent the entrepreneur's pattern of strategic organizing–is examined for quantitative configurations of activity that are stable within a determined range. This period of stability is called an organizational epoch, and it corresponds to a distinct generative mechanism of organizing (Dooley and Van de Ven, 1999). More than one organizational epoch may be represented in the data if a change point is identified in one of the time series. Change points are particular points in time where the mean, variance, or dynamical parameter of the time series undergoes a statistically significant change. For a more complete explanation of this method, see Appendix B.

7.4. Emergence of a new epoch in strategic organizing

Visual displays of each of the four time series are presented in Fig. 1; this data is used to test the stability of the pattern of strategic organizing, whether there was a change in the
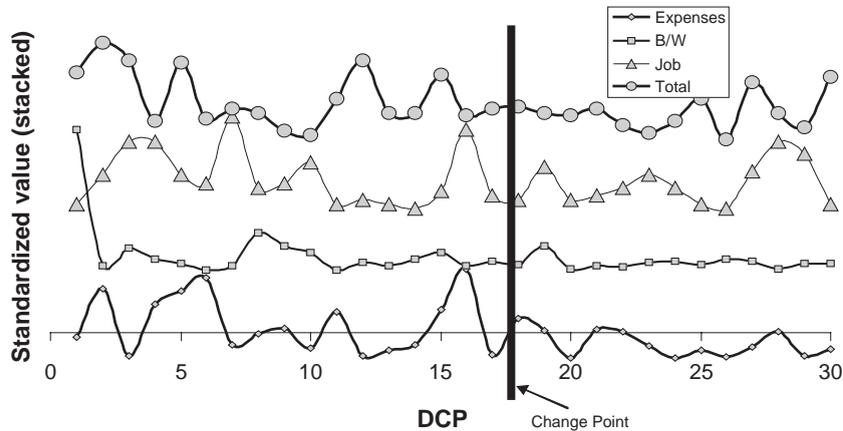
Fig. 1. Time series analysis of a change point in HealthInfo.

generative mechanism underlying the organizing, and if so, the pattern of that change. Statistical analysis of the control charts indicates that there was a distinct (statistically significant) change point after DCP 18 (August 14th 1999) for the *EXPENSES* time series. Further analysis indicates that behavior on either side of this change point is random, indicating two distinctive organizational epochs separated by a punctuated phase change (Cheng and Van de Ven, 1996; Dooley and Van de Ven, 1999). The first epoch runs from DCP 1 through DCP 18 (December 1998 through August 14th, 1999) and the second one starts on DCP 19 (August 27th, 1999) and continues through the end of the time series, DCP 32.

This shift in organizational epochs is further evidenced by rather significant reductions in the mean and/or the standard deviation of *B/W*, *EXPENSES,* and *TOTAL* in the second epoch as compared to the first, as shown in Table 2. These statistically significant differences validate the presence of two distinct organizational epochs in the data, each driven by a unique generative mechanism, and separated by a dynamic phase change.

As suggested from theories of emergence, the data show that the pattern of organizing change is virtually instantaneous: the two epochs are separated by single point of punctuation. Specifically, epoch 1 is stable for approximately from DCP 1 to DCP 17, and

Table 2
Testing for a "change point" across all variables

Variable	Data	Estimated change point	Degree of change
EXPENSES	Mean	DCP 18*	Decreased by 58%
	Variance	DCP 18**	Decreased by 55%
B/W	Mean	DCP 18**	Decreased by 55%
	Variance	DCP 18***	Decreased by 82%
TOTAL	Mean	DCP 18*	Decreased by 34%
	Variance	None	–
JOB	Mean	None	–
	Variance	DCP 18*	Decreased by 27%

p-value associated with hypothesis of change point: ***$p < 0.001$; **$p < 0.01$; *$p < 0.10$.

epoch 2 from DCP 19 to DCP 32, with a transition period encompassing DCP 18 and DCP 19. As a ratio of stability to change, the emergence of a new pattern of strategic organizing occurs in only 3% of the total data period, supporting a punctuated equilibrium model.

8. Mode #3: "tactical organizing"—start-up activities

8.1. Identifying start-up activities

Our iterative analysis of the qualitative data revealed a third mode of organizing: the start-up activities that were completed by the entrepreneur. Start-up activities are a discrete set of behaviors and indicators; the list of these 28 activities has been generated through theoretical and empirical research on the activities employed by nascent entrepreneurs that lead to organizational emergence (Carter et al., 1996; Gatewood et al., 1995; Reynolds and Miller, 1992). Evidence suggests that many of these activities are common across nascent entrepreneurs (Gartner and Carter, 2003; Reynolds, 2000). They include such activities as writing a business plan, organizing a start-up team, developing a prototype, hiring employees, making a first sale, and so on. These activities are tactical because they represent specific, directed actions that lead to the goal of organizational creation.

In the case of HealthInfo, we were looking for patterns of tactical organizing that corresponded to these 28 formal categories of start-up behavior. Two of the authors independently read through each interview, and identified a specific list of start-up behaviors and a date for each. We compared our lists and discussed differences until agreement was reached on the number and timing of start-up behaviors for the case. The entrepreneur then validated these, a technique recommend by a variety of qualitative researchers (Denzin, 1989; Erlandson et al., 1993). We identified nine start-up behaviors in the data:

• Invested own money	• Organized founding team	• Purchased major equipment
• Developed a prototype	• Formed legal entity	• Opened business bank account
• Defined opportunity	• Installed business phone	• Asked for funding

8.2. Punctuation in tactical organizing at HealthInfo

The earliest start-up activity in the data was *investing own money into the business*, an average of less than $50/week, which began in January of 1999. With this exception there were no specific start-up activities for the first 9 months of her organizing, until July of 1999. Then, within a span of only 2 weeks (DCP 16–DCP 17, i.e. July 15th to July 27th, 1999) the entrepreneur completed five formal start-up activities. She produced a *Prototype* web site [DCP 16], held a series of focus groups to *Define the Opportunity* [DCP 16], *Organized a Founding Team* [DCP 17], *Incorporated* as HealthUSA [DCP 17], and had an '800' *Business Phone Line* installed [DCP 17]. One month later she completed two more activities, *Purchasing Major Equipment* for the business [DCP 21] and opening a *Business Bank Account* [DCP 22]. Six weeks later she *Asked for Funding* for her project [DCP 25].
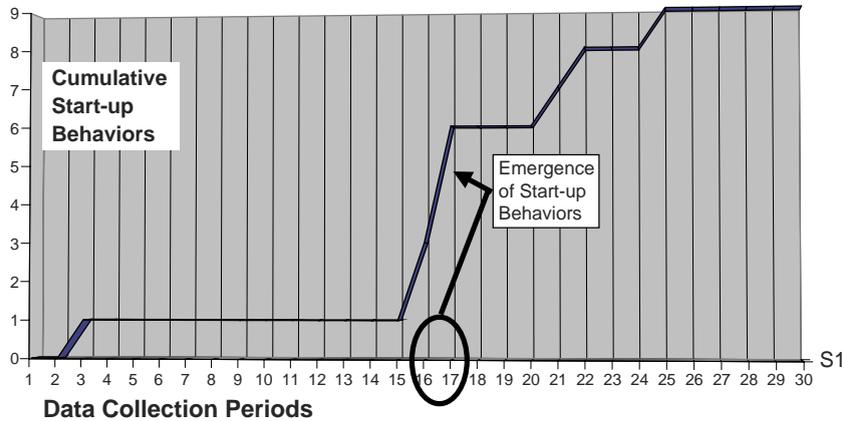
Fig. 2. Punctuated change in tactical organizing: start-up activities at HealthInfo.

A cumulative graph of these tactical organizing activities is presented in Fig. 2. Using Monge's (1990: 411–415) terminology of dynamic analysis, this is a high magnitude non-periodic increase, followed by a short series of lower magnitude non-periodic changes. The dramatic, punctuated increase in the rate of start-up activities may indicate the emergence of a new generative mechanism for tactical organizing (Dooley and Van de Ven, 1999). This interpretation provides an additional validation of the idea that something significantly new emerged at HealthInfo around the late summer of 1999. Next, we explore the nature and dynamics of that process which we call an "emergence event."

9. The dynamics of an emergence event at health-info

9.1. Defining an emergence event

According to our analysis, a significant shift occurred in each of the three modes of entrepreneurial organizing during the first 15 months of this venture. Firstly, as mentioned above, our analysis shows that the entrepreneur's organizing vision underwent a qualitative transformation in the late summer of 1999, resulting in the emergence of an entirely new context for her business concept. Secondly, the emergence of a new configuration of strategic organizing is revealed in the statistically significant change point that occurred in *EXPENSES*, *B/W*, and *TOTAL* during the summer of 1999. Thirdly, a punctuated shift was also seen in the rate of tactical organizing, with the completion of eight distinct activities late in the summer of 1999.

Are these three punctuated and emergent processes related? If they were coordinated, we would expect that all three punctuated shifts would occur at roughly the same time. Management scholars have favored this idea, having found empirically that qualitative (system-wide) change often occurs in a "punctuated" way, i.e. in a

single coordinated leap rather than independently or incrementally (Gersick, 1988; Miller and Friesen, 1984; Romanelli and Tushman, 1994). This framework of organizational punctuated equilibrium has successfully been applied to small and emerging businesses (Covin and Slevin, 1997; Greiner, 1972). Punctuated change is also at the heart of Katz's (1993) model of organizational emergence, and Bygrave's (1989) new science models of entrepreneurship. Given the highly interdependent nature of entrepreneurial organizing, we would expect that emergent change in one mode would necessarily affect every other mode of organizing; thus we argue that changes across modes would be nearly simultaneous and punctuated.

How closely correlated were the shifts in organizing vision, strategic organizing, and tactical organizing at HealthInfo? Our analysis shows that punctuated changes within all three of these modes occurred between DCP 16 and DCP 19. This 6-week period represents only 9% of the total research period. Thus, our analysis strongly suggests that these three shifts are coordinated in an important way.

We refer to such a system-wide shift as an "emergence event," and we define an emergence event as a coordinated and punctuated shift in multiple modes of entrepreneurial organizing at virtually the same time, which generates a qualitatively different state–a new identity–within a nascent venture. Before drawing out some of the implications of an "emergence event," we describe the internal sequence of the process.

9.2. The dynamics of an emergence event at HealthInfo

Detailed dynamics of the emergence event at HealthInfo can be discerned by looking closely at the sequence of changes across the three modes of organizing. The emergence event begins in the summer of 1999 with a dramatic, non-linear increase in the rate of tactical organizing that occurs during DCP 16 and DCP 17. This punctuated shift is immediately followed by the emergence of a new organizational epoch on DCP 18, when the nascent entrepreneur's pattern of strategic organizing underwent a qualitative shift. Then on DCP 19 we see the emergence of a new organizing vision, as the creation of a radically altered business opportunity.

Under the assumption that these three modes of entrepreneurial organizing are coordinated and interdependent, we describe the dynamics of HealthInfo's emergence event in terms of a causal sequence (Dooley and Van de Ven, 1999). The HealthInfo emergence event was initiated by a punctuated shift in tactical organizing, which generated the emergence of a new epoch of strategic organizing, which then led to the emergence of a new opportunity. A process description of these activities is:

| Tactical Organizing | ⟹ | Strategic Organizing | ⟹ | Organizing Vision |
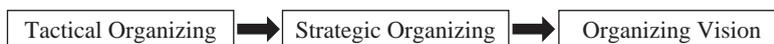
In the next section we present some implications of this sequence, and pursue some initial theorizing about its generative mechanisms.

10. Theorizing about the emergence event

10.1. Emergence event dynamics

A careful look at these dynamics reveals a pattern that has been described by a small number of entrepreneurial researchers. In essence, the behavior of the entrepreneur–her tactical organizing–precedes her decision making–strategic organizing; these behaviors preceded her conceptual framing for the business—organizing the vision. This sequence reflects a behaviorally based view of new venture creation in which the tangible, behavioral resources available to a nascent entrepreneur take precedence over her cognitive, goal-oriented aspects of the organizing process. This process shares several properties of Weick's (1995) theory of sensemaking. For example, just as sensemaking involves the "enactment" of our immediate (behavioral) environment, so the HealthInfo entrepreneur's behavioral change created a new contextual environment within which she engaged in other changes. This enactive mode is the core of Gartner et al.'s (1992) "acting-as-if" model of nascent entrepreneurship, as well as Gartner's (1993) description of organizational emergence. Sarasvathy (2001a,b) has recently integrated these approaches as the "effectuation" model of causality, in which the resources currently at hand become the basis for opportunity formulation. In contrast, most current literature on opportunity recognition posits the process to be directed by some measure of rational decision-making, through which an opportunity is identified, then evaluated, then enacted in turn (Ardichvili et al., 2003; Hills et al., 1999; Shane, 2000). The emergence event dynamics we identified may provide useful insights into the causality and directionality of opportunity formation and business creation.

10.2. On the generative mechanisms of an emergence event

Going deeper into the sensemaking of the HealthInfo entrepreneur helps uncover the triggers for each punctuated shift; these may provide some insight into the generative mechanisms that drive this emergence event (Van de Ven and Poole, 1995). For example, in the 2 weeks of punctuated change in tactical organizing [DCP 16–17], the entrepreneur expressed "frustration" three different times [DCP 16–17]; she told the interviewer how "hard" this was [DCP 17] and that she was "not getting the work done" [DCP 16]; and she talked about being "frightened" that this whole endeavor might not work. This internal conflict, and the punctuated shift that comes from it, reflects a "dialectical" process, one of four key change motors summarized by Van de Ven and Poole (1995). In dialectical change, a struggle or inconsistency is resolved through a transformation that re-sets the context within which the struggle had existed. This generative mechanism appears to play an important role in triggering the HealthInfo tactical change and initiating the emergence event.

Similar expressions of internal conflict were made in the face of strategic organizing change. On DCP 18 she again perceived a lack of progress, she described the project as being "challenging;" and talked about being "ping-ponged" back and forth in her efforts [DCP 18]. However, a second generative mechanism also comes through in that same interview. She made a clear decision to put the web site on hold for a period of time; she

expressed the need for the business to "expand beyond me" [DCP 18], and she said she "want[ing] to be the boss, and hire people" [DCP 18]. These latter expressions reflect the "teleological" change motor, which emphasizes the agent's role in initiating change (Van de Ven and Poole, 1995). In contrast to the dialectical model that has *conflict* at its core, the teleological model focuses on *agency* as the essential driver of transformative change, and on the decisions and actions that are chosen to pursue change. Thus, the second mode of organizing is driven by agency (teleological) as well as by conflict (dialectical). This is consistent with Van de Ven and Poole's (1995) insight that some changes involve more than one change mechanism.

The teleological motor also appears to drive the emergence of a new organizing vision. During that interview, the entrepreneur describes her renewed focus on "core values" [DCP 19], her intention to "cross this line, reach this threshold of activity" [DCP 19], and her achievement of "reestablishing my routine" for working on the business [DCP 19]. She expresses none of the frustration and conflict that were central to the previous shifts. Thus we suggest that the teleological motor worked alone in the transformation of vision, and in completing the emergence event.

In combination, the emergence event at HealthInfo begins with internal struggle and conflict; these are resolved through the entrepreneur's own agency and intention, which drives the emergence of a new context: HealthUSA. In formal terms the emergence event is initiated by a dialectical motor, it progresses when the dialectical motor begins to interact with a teleological motor. The emergence event is completed when the teleological motor acts alone.

In addition to the interactions between these two generative mechanisms, something else fundamentally shifts in the process of emergence.

10.3. On the nature of an emergence event

Emergence is not a subset of change, it reflects a different type of process. Change–even transformation (Gersick, 1988; Romanelli and Tushman, 1994)–involves a modification of what previously existed; it produces an extension of what is already there. Change involves an alteration, a variation, an adjustment that in some measure refers back to the initial state of the system. In contrast, emergence involves the creation of something genuinely new, the generation of a new context within which the previous state of the system still remains. What philosophers of emergence mean by "qualitative novelty" is that emergence generates a new level or type of order, an autonomous entity of sorts, which is independent from the components that make it up (Koestler, 1979; Goldstein, 1999). Rather than a modification of single entity, emergence implies the creation of a new entity which is made up of that original entity and several others as well. The emergence of HealthUSA from HealthInfo exemplifies this philosophical definition of emergence.

In this sense, an emergence event implies much more than a change of heart, or the pursuing of a new direction in organizing. It implies the creation of a new conceptualization, not always conscious, within which the entrepreneur's organizing is re-contextualized. Moreover, according to our definition, this reframing occurs in not just one or two modes of organizing, but in at least three distinct activity modes, and all at the same time. This kind of coordinated, system-wide re-creation has the capacity to alter the

very identity of the firm (Gioia et al., 2000) and the entrepreneur (Huy, 1999). Thus, an emergence event may be one of the most important dynamics within new venture creation.

11. Conclusion

To answer the question, "how can entrepreneurship scholars reveal the multi-layered dynamics of new venture creation?" we developed a rich, longitudinal case study design that captured multiple sources of data, and contained insight into the attitudes, cognition, and behavior of the nascent entrepreneur. The research method we used, longitudinal content analysis, identified a variety of patterns that help explain that dynamics of nascent entrepreneurship. First, we found that that the dynamics in the case were best organized into three different modes: strategic organizing, tactical organizing, and organizing the vision. Second, our analysis showed significant punctuated shifts within each of those modes, and that the shifts occurred at virtually the same time, leading to a dynamic process we define as an "emergence event." In addition, we explored the internal sequence of the emergence event, which was initiated by a shift in behaviors, which led to a transformation in strategic organizing, which then generated the emergence of a new vision. These shifts were driven by two distinct generative mechanisms–a dialectical mechanism and a teleological mechanism–which interacted to trigger and complete the emergence process.

The analyses and interpretation of data from HealthInfo is limited in several ways. As a single case it is not necessarily generalizable (Yin, 1984). While not a problem in terms of the inductive nature of this research, little more can be done with these results without broader empirical testing within similar contexts. Equally important, this particular start-up effort may not be representative of other nascent firms, in that the entrepreneur was not working full-time on the venture, and the idea was only indirectly based on her professional expertise. Another issue is the potential bias of the data themselves. However, by using known approaches for minimizing that influence (Barley, 1990; Erlandson et al., 1993), and by balancing our data collection procedures with practices from appreciative inquiry (Cooperrider and Srivasta, 1987), this influence may be limited and turned into positive results.

We recognize that the methods we used helped us identify the subtle dynamics within the emergence event, a sequence that has eluded entrepreneurship researchers. In fact, this sequence eluded us during the process of data collection and initial analysis. That is, none of us recognized the presence of an emergence event while we were collecting, transcribing, and coding the interviews, nor did we have any idea of the sequence of such an event. It was only after we had analyzed the data using the new methods that we were able to see the punctuated changes within modes, as well as the correlation of those changes across modes and the sequence of changes as a whole. The fact that we as researchers were unaware of the transformation while it was happening underscores the power of the non-linear methods to offer a degree of subtlety that may be highly useful in a new era of entrepreneurial research.

Although numerous researchers have suggested the new venture creation and growth involves punctuated and dynamic phase changes (Schumpeter, 1934; Bygrave, 1989; Katz, 1993), the presence of this phenomenon has been under-explored in entrepreneurship

theory and research. Moreover, although a variety of scholars use the term "emergence" to describe new venture creation (Katz and Gartner, 1988; Gartner, 1993), the empirical dynamics underlying emergence have been opaque in theory and in research. We contribute to the field by describing three distinct modes of entrepreneurial organizing, by defining and operationalizing an "emergence event" in the new venture creation process, and by uncovering the dialectical and teleological drivers of the emergence event in this case. As such we provide a framework for theorizing about emergence dynamics and their role in successful start-up efforts.

The importance of new methods for understanding entrepreneurship is well expressed by Monge (1990: 408) who suggested that "…innovations in methodology can often provide the impetus for developments in theory, just as theoretical advancements often require the development of new methodologies." Like others, (e.g. McKelvey, 2004), we believe that the kind of non-linear approaches we've introduced here, and the theoretical insights gained in the process, will help strengthen and advance the nascent research on organizational emergence.

Acknowledgements

Appendix A. Centering resonance analysis

Content analysis seeks to interpret the meaning of texts (Holsti, 1969). In this case study, interview transcripts served as texts to be interpreted. There are two different ways to perform content analysis—a manifest approach which counts actual words present, and a latent approach which counts "semantic themes" as coded by an analyst interpreting the text. In order to examine the cognitive and attitudinal themes within the interviews, we chose to analyze them using a manifest approach. Manifest content analysis is particularly sensitive to subtle semantic choices that may indicate important cognitive differences. For example, use of the word "firm" versus "organization" may discriminate between two different cognitive maps (McPhee et al., 2002).

The method used was Centering Resonance Analysis (CRA; Corman et al., 2002), which represents a text as a network of connected words. The computational linguistics of CRA are based on "centering theory" which posits that speakers and writers construct and locate noun phrases within a stream of discourse in such a way so as to create coherence (McKoon and Ratcliff, 1998).

CRA begins with lexical analysis, which ensures a "clean" text devoid of non-discursive symbols. Sentences are then parsed into noun phrases. Nouns and adjectives within noun phrases are represented as nodes of the network, and connections are generated according to the structure of the noun phrases. After the CRA network is constructed, one can perform a variety of network analyses to comprehend the discursive content of the text. One measure is

word influence, which measures the structural importance of the word within the discursive network, rather than its frequency of use (Corman et al., 2002). The *influence* of a word is measured by calculating the centrality "betweeness" of the word's node within the CRA network (Freeman, 1978). Words that are high in influence create coherence in text by connecting words that would otherwise not be connected. Influential words can be thought of as a text's "centers of gravity". Influence values are normalized between 0 and 1. While the average influence of words changes slightly due to text size, in general influence values above 0.01 are considered significant, and values above 0.05 are considered very significant.

Resonance measures the structural similarity of CRA networks (Corman et al., 2002). The greater the resonance between two texts, the more influential words they have in common. For example, if an important issue or event spanned a time period encompassing several interviews, we would expect high resonance between the interviews, as they contained similar discursive content. Likewise, if events were quite different and changed, we would expect low resonance between successive interview texts. Resonance values are normalized between 0 and 1, so they can be treated as a correlation value (although they cannot take on a negative value).

Appendix B. Event time series analysis

The quantitative data generated in the case was analyzed for change points. A change point is the moment in a time series when the associated variable undergoes a shift in its mean or variance. As the variable is indicative of a particular construct, a change point in the variable's time series indicates a change in that construct. Change points were identified using statistical quality control methods (Montgomery, 1996). A combination of statistical tests and heuristic interpretive rules were used to determine if a change in mean or variance has occurred in the time series, and estimate when that change occurred. Specifically, "control limits" were found for each time series. Points which plot beyond the control limits indicate a change in the underlying system. Control limits are based on an estimate of the short term variation within the time series.

When a change in the underlying system has some degree of permanence, then the change point represents a temporal marker. Prior to the change point, the variable's mean level is constant and indicative of one level of the construct, and after the change point, the variable's mean level is also constant, but different, and indicative of a new level of the construct. In this case, the change point separates two "epochs"—periods of time where the system's behavior is statistically stable, but which are qualitatively different from one another.

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