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ABSTRACT: This article considers business models through the lenses of both design science and the design orientation in management. It describes a new way of thinking about and engaging with business models as patterns. The term "business pattern" is used to refer to a coherent and repeating sequence of action involving humans, machines (including information technologies systems) and artifacts (such as data structures) as a way of organizing a firm. The study also describes a way of visualizing either existing business patterns or envisaged business patterns through the design artifact of a pattern comic. This is used to provide a narrative of some business pattern in principle or in practice. The design theory of a business pattern as well as the design artifact of a pattern comic offer a range of contributions to the literature on business models. First, they permit a clearer distinction to be drawn between business model, business motivation, and business strategy. Second, they suggest a clearer way of building models of "business" (organizing) either as currently conceived (as-is) or in terms of envisaged models (as-if). This also allows clearer expression of business motivation in terms of transitions between as-is and as-if business patterns. Third, business patterns offer a practical way of thinking about the reuse of business models as patterns and their potential for benchmarking purposes. To help ground both the theorization and the visualization proposed we apply the design theory of a business pattern and the design artifact of pattern comics to help make sense of the domain of online grocery.

KEY WORDS AND PHRASES: Business model, business motivation, business pattern, design science, digital business, online groceries, pattern comic.

The concept of a business model has been much considered in recent literature [7, 8]. The term "business model" is also important to much recent management discourse that attempts to make sense of strategy in times of rapid technological change. Not surprisingly, business models have been particularly used as a way of understanding the impact of innovation with information technology on business practices—an area referred to traditionally as electronic business and electronic commerce but more recently as digital business [12, 30, 103].

It is evident from such literature and discourse that the notion of a business model implicitly uses a framing of organization based in the idea of an open system [105]—sometimes a complex, adaptive system [89]. Zott,

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Amit, and Massa [109] suggest that business models offer a holistic approach to understanding business. The "equifinality" characteristic of open systems implies that different systems of organizing can be designed to fulfill the same purpose [41]. This begs the question as to how they should be designed and it is as an aid in this task that the concept of a business model is seen to have utility [95]. With the rise of digital business, such design options multiply [7, 107]. Chesbrough sums this up by saying that "business model innovation is vitally important, and yet very difficult to achieve" [26, p. 362].

In this study, we wish to consider business models through the lens of design science [61] and the associated design orientation in management [16]. March and Smith believe that "design science attempts to create things that serve human purposes" [61, p. 253]. We propose the business model as a key conceptual tool for driving the design orientation in management. Simon defined design as "courses of action aimed at changing existing situations into preferred ones" [88, p. 40]. A stream of inquiry within the management academy has recently called for design to be placed at the center of what it means to manage [16]. This has led to significant calls for management education and practice to be reconfigured to promote design thinking [32, 91].

But the business model as a design construct suffers from problems. Teece [94] argues that the concept of a business model has no established theoretical grounding in any of the economics or business disciplines. Arend argues that the term "business model" as "a description of how a traditional venture operates is strong on redundancy and weak on theoretical grounding" [6, p. 390]. Porter concurs and argues that the definition of a business model is murky at best and that "the business model approach to management becomes an invitation for faulty thinking and self-delusion" [82, p. 64]. Thus he believes that business models as constructs are consequently unfruitful for understanding issues of business change and business strategy, particularly as it pertains to digital business [52].

Design science works through design theories and design artifacts. A design theory specifies a set of practices for engaging with design whereas a design artifact instantiates a design theory. We propose an innovative design theory for business models that is based on patterns but relies on theory derived from the literature on organizational routines, sociotechnical thinking, and narrative explanation in the social sciences. We show how this theorization better encapsulates certain lessons about the nature of business models derived from the general business literature. Also, we show the relevance of this design theory for making sense of digital business by reflecting it against the current literature on digital business models.

We suggest a way of instantiating the design theory of a business model through the innovative design artifact of a pattern comic. We propose that this design artifact has potential for business modeling, particularly when used by practicing managers and technologists to make sense of the agency of information technology in business innovation and change. It allows easy expression of current or *as-is* business models as domains of sociotechnical action, giving equal primacy to technology as well as humans in business innovation. It can also be used as a mechanism for more clearly expressing equifinality—new ways of organizing sociotechnical action. These *as-if* business models can then be analyzed in terms of some defined expression of

business purpose, which we refer to as a motivation model. A chosen *to-be* business model can be further used as the centerpiece for driving strategic change and innovation in some setting. We propose that expressing a business model in this manner may provide greater clarity to issues of business model reuse and benchmarking.

We provide various illustrations of the use our design theory and design artifact in making sense of innovation in the domain of online grocery. Online grocery is a particularly interesting aspect of online retail because of the way in which strategy is currently being played out as a series of "experiments" with various business patterns by major market players [68]. Arend [6], as one of his six key research areas for the business model concept, sees value in ways of understanding the emergence of new business models in an industry as a way of fostering innovation. To date, the innovation in this domain has primarily been one of process innovation, but there are some obvious ways in which new patterns can foster what Yoo, Henfridsson, and Lyytinen [107] refer to as digital innovation. We also compare our proposal with related approaches and distinguish between those approaches that occupy a similar space in treating business models as design concepts and those that take a similar systems viewpoint. We conclude with a discussion of some avenues of further work.

The Nature of Business Models and Digital Business Models

In this section, we consider what current literature tells us about the nature of business models. We summarize this literature as a series of key lessons that help frame features of a business model as a domain construct [61]. We then consider the literature on digital business models, which leads us to refine certain of our lessons to account for the unique position of information technology in organizational change.

The first lesson is that *business models are models*. Baden-Fuller and Morgan [9] portray a number of different senses in which business models may be treated as business models—they provide a useful way to describe and classify businesses, as sites for scientific investigation, and to act as "recipes" for creative managers. In the first sense, a business model is a description of a "kind" or ideal-type of business. In the second sense, a business model consists of an entity upon which both academics and managers can conduct "experiments" of various forms. In the third sense, a business model acts as a "recipe" that managers can use to accomplish aspects of business practice. In this latter sense, Baden-Fuller and Mangematin [8] argue that business models are particularly useful as cognitive instruments—as a fruitful kind of configuration that may be manipulated cognitively by managers. In relation to digital business, Osterwalder and Pigneur [72] have a contrasting view of a business model as an ontology for a particular business domain. In philosophy the term ontology [31] is used to stand for a theory of reality, or more precisely theories that consider the nature of being or the kinds of things that have existence. More recently, the term ontology has been adopted both by academics and practitioners in the information disciplines [56] (information systems, information management, information science,

and computer science) to denote a "formal explicit specification of a shared conceptualization" [50, p. 200]. In this sense, a business model would be considered an ontology that specifies what is deemed to exist in some bounded area of institutional reality.

The second lesson is that business models are narrative models not motivation models. Magretta [60] argues that "Business models ... are at heart, stories—stories that explain how enterprises work." She believes that "creating a business model is ... a lot like writing a new story. At some level, all new stories are variations on old ones, re-workings of the underlying themes underlying all human experience." Revenue models, in contrast, involve outlining the "underlying economic logic that explains how we can deliver value to customers at an appropriate cost?" [60, p. 87]. Revenue models are one way of establishing motivation for organizational change. We use the term motivation model here to refer collectively to some expression of the need for business change. Hence, in the private sector, increased profit might be the primary motive for change, while in the public or voluntary sector, the motive for change might be expressed in terms of better service provision. Arend [6] calls for exploration of the value of the business model concept in nonprofit domains, such as government agencies, where revenue generation is not the motivator but the effectiveness of service delivery.

The third lesson is that *business models are different from but related to business strategy*. Magretts [60] also argues that a business model is not the same as a strategy. A business model describes how the business works but a competitive strategy explains "how you will do better than your rivals" [60, p. 90]. Seddon et al. [87] concur that strategy and business model are related but different concepts.

> A business model outlines the essential details of a firm's value proposition for its various stakeholders and the activity system the firm uses to create and deliver value to its customers ... a business model may be defined as an abstract representation of some aspect of a firm's strategy. However, unlike strategy, business models do not consider a firm's competitive positioning. [87, p. 427]

Casadesus-Masanell and Ricart [24] distinguish between strategy, tactics, and business model in the following terms:

> Business model refers to the logic of the firm, the way it operates and how it creates value for its stakeholders; and strategy refers to the choice of business model through which the firm will compete in the marketplace; while tactics refers to the residual choices open to a firm by virtue of the business model it chooses to employ. [24, p. 195]

The fourth lesson arises from viewing business models as activity models (such as that used by Seddon et al. [87]). Business models outline the sequences of action necessary for the achievement of certain goals that may have strategic consequences. Zott and Amit [108] clearly focus on the notion of a business model as a set of interrelated activities. They define a business

model as an activity system that transcends the boundaries of the firm into its wider environment. Zott, Amit, and Massa [109] suggest that a firm's activities play a dominant role in the way in which business models are conceptualized. They also propose that business models seek to explain how value is created—suggesting that there is a family resemblance between the concept of a business model and that of a value-creating system [76]—a concept that is particularly useful in terms of explanatory power because of its basis in systems thinking [54] and its clear linkage with the concept of the value chain and value network evident in Porter's work [82, 83]. According to this view, organizations are conceived of as chains of activity systems [25] associated with the production and dissemination of value, which in their entirety can be portrayed as value-creating systems [76]. Linder and Cantrell [58] define a business model as the organization's core logic for creating value. For commercial organizations, the value created will typically constitute products. For public sector organizations, value will typically be embodied in the services such organizations provide. In the community, value will constitute social capital—networks of information, trust, and reciprocity [84].

The fifth lesson is that *business models can be fruitful as a means of developing taxonomy*. Baden-Fuller and Morgan [9] argue that business models as ideal types may be organized in wider taxonomy. In this regard, Osterwalder, Pigneur, and Tucci [75] make an important distinction between the business model concept as a metamodel and a business model as a type, perhaps as a type within a larger taxonomy of types. Business models as types should also be distinguished from business models as instances. For example, the business model of Tesco online and the business model of Ocado may have certain characteristics in common that may be abstracted in a business-model type, such as that of an online grocer. They further believe that a business model should be a holistic representation of the core logic of all of some business, not a particular part of the business [73].

At the turn of the century, Alt and Zimmerman [4] in their introduction to a special issue of *Electronic Markets* on eBusiness models argued that consensus on the elements of a business model was lacking but that business models are largely believed to help determine the success of an electronic venture. Little appears to have changed in the intervening decade and a half [99]. Osterwalder and Pigneur, for instance, describe a business model as the "conceptual and architectural implementation of a business strategy [that] represents the foundation for the implementation of business processes and information systems" [72, p. 256]. Al-Debei and Avison [2] concur in placing a business model as a multifaceted concept that mediates strategic outcomes with information and communication technology–enabled business processes. This accounts for the observations of Hedman and Kalling [52] and Pateli and Giaglis [77] that the concept of the business model has been most productively applied to digital business (eBusiness and eCommerce).

The key problem is that the architecture of digital business models is expressed in the majority of extant literature as a set of integrated features, building blocks, or components of organization [45], rather than as a narrative of sociotechnical action. In the 1990s, IBM used a component-based approach that divided a business model into a horizontal set of typical

business functions (such as administration) and a vertical set of purposes (direct, control, execute). Pateli and Giaglis [77] conducted a bottom-up analysis of eBusiness models and suggested that such models are typically defined in terms of a number of standard components such as mission, target market, value proposition, resources, activities, cost and revenue model, and value chain or value network. Gassman, Frankenberger, and Csik [42] treat business models as similar patterns of strategic elements such as the customer, the value proposition, the value chain, and the profit mechanism. Osterwalder and Pigneur [73] in their earlier business model canvas and in their more recent value proposition canvas [74] take a feature-based approach, suggesting the importance of infrastructure, offering, customers, finances, and resources.

We suggest that such a features-based approach although useful, makes it difficult to see the relationship between strategy, processes, and information systems—which is seen as the key orientation of digital business models. In other words, a feature-based approach to business models makes it difficult to make sense of ways of organizing as sociotechnical ensembles of action. In the next section we suggest a particular design theory directed precisely at this issue.

Design Science, Design Theory, and Design Artifacts

We see value in approaching the nature of digital business models from the position of design science. Indeed, we suggest that the notion of a business model is usefully recast as a design theory for some system of sociotechnical action. To instantiate such design theory we need a suitable design artifact for expressing not only the narrative of current sociotechnical action but also narratives of envisaged sociotechnical action as well as plans for implementing sociotechnical action.

The idea of a design science, distinct from a natural or a social science, was first proposed in Simon's *Sciences of the Artificial* [88]. For Simon, such a science is directed at the production of artificial entities (artifacts) rather than something that occurs naturally. Hevner et al. [53] have packaged this perspective more recently as a design science and like Simon believe that such a science should be a "tough, analytic, partly formalizable, partly empirical, teachable doctrine" [88, p. 58]. There is a certain synergy between proposals for a design science and the development of design thinking in management [16, 32, 36, 46, 91]. Some have even suggested that management broadly as an academic endeavor should be conceived of as a design science [63, 97, 100].

Members of academia have proposed a conception of design science that is focused both on building theories and constructing artifacts for design and action [47, 48, 53]. According to Gregor and Hevner [48], design science research in this tradition "involves the construction of a wide range of socio-technical artefacts such as decision support systems, modelling tools, governance strategies, methods for IS evaluation and IS change interventions" [48, p. 337]. But such design artifacts should also be situated in appropriate design theories. Design theories focus on how to do something. They provide explicit

prescriptions on how to design and develop an artifact—whether the artifact is a product of technology or a methodology for doing something, including managerial intervention. It should be evident from this discussion that critical to all three interrelated notions of design science, design theory, and design artifact is that of the artificial "object"—the artifact—produced as the outcome of any design practice that hopefully also serves to instantiate some design theory [49].

Gregor [47] suggests that design theory can be seen as one of the five fundamental types of theory relevant to the discipline of information systems. Gregor and Jones [49] propose eight component parts of an acceptable and justifiable design theory. Although not mentioned by these authors it is useful to divide these principles or components into two halves, which, borrowing from Simon's definition of design science, we refer to as the *doctrine* and the *application* of a design theory [45].

The first four component parts of a design theory [49] establish its doctrine—a set of ideas or beliefs that are believed to be true. The doctrine of a design theory consists of (1) purpose and scope, (2) justificatory knowledge, (3) constructs, and (4) principles of form and function. The *purpose and scope* of a design theory indicates what type of design artifact the theory applies to and defines the boundary of applicability of the theory. *Justificatory knowledge* specifies the underlying sources of knowledge on which the design theory is based. *Constructs* provide representations of the entities of interest in the theory. *Principles of form and function* provide an architecture that describes artifacts produced by the design theory.

The doctrine of our design theory is situated in the notion of patterns of sociotechnical action—which we refer to as business patterns. In terms of *purpose and scope*, we see business modeling involving acts of making sense of business patterns. In terms of *justificatory knowledge*, we think of business patterns as constitutive routines of sociotechnical action. As *constructs* we think of business patterns in terms of three layers of interrelated action, which serve to build patterns of articulation, communication, and coordination. Finally, in terms of *principles of form and function* we see such patterns as entangled, meaning that although they can be separated analytically, they are coupled in continuous praxis.

The application of a design theory [49] refers to how such theory may be applied in practice. Such application demands (1) principles of implementation, (2) expository instantiation, (3) testable propositions, and (4) artifact mutability. *Principles of implementation* provide a description of the processes by which the theory may be implemented in specific situations. *Expository instantiation* indicates a physical implementation of the artifact that can be used both as a mode of exposition and for the purposes of testing theory. *Testable propositions* refer to the ways in which instantiations of a design theory may be evaluated in practice. *Artifact mutability* indicates changes in the state of the artifact anticipated by the theory.

In practical application, we suggest that it is possible to instantiate our design theory through comics of patterned sociotechnical action. In *principles of implementation*, comics are proposed as a useful way of visualizing the narrative of business patterns that constitute some domain of sociotechnical organization. They are also proposed as a way of expressing new ways of

organizing. As *testable propositions* about the nature of sociotechnical organization, three types of model of business patterns need to be constructed: as-is (current), as-if (envisaged), and to-be (planned). As *expository instantiations* these models serve to accumulate common ground between the business modeler and organizational actors; such common ground is critical to changing patterns of sociotechnical action. Finally, regarding *artifact mutability* we suggest the importance of abstracting business patterns and using such abstraction in pattern reuse and benchmarking.

Business Patterns

The idea of pattern is central to many disciplines. For instance, Alexander [3] proposed that architectural design is based on a number of archetypal patterns that encapsulate fundamental principles of building design. This idea has had much influence in other disciplines such as software engineering, where design patterns are proposed as general solutions to programming problems [51]. Eriksson and Penker [39] have proposed the construction of business models as UML (Unified Modeling Language) patterns.

A pattern is anything that repeats across more than one situation. The things that repeat within a business pattern are various types of action undertaken not only by humans but also by "machines" such as information technologies systems) and somewhat by artifacts (such as records). We therefore see business patterns as enacted routines of sociotechnical action [38]. There is a developing consensus about three core features of routine action in organizations [40]. An organizational routine is (1) a repetitive pattern (2) of interdependent actions (3) involving multiple actors. There is also growing awareness of the differences between routines in principle and routines in practice [80].

Business patterns are narrative models of sociotechnical action. Abell [1] proposes that any form of narrative expression is made up of the following elements, which we extend to take account of the nature of sociotechnical organization:

- A finite set of actors, which may be individual or collective. They may be humans or institutions, artifacts or even "machines";
- A finite set of descriptive states relevant to some domain of sociotechnical organization;
- A weak order in time expressed on the set of states. This defines the chronology of states for the domain;
- A binary causal relation between some pairs of states. The relations will run from earlier states to later states in the chronology. These ordered pairs can be considered events in the business pattern;
- A finite set of actions that transform some elements of the states of the world. The actions transform earlier to later states in the chronology of the business pattern. Actions are partitioned into acts of articulation of data structures, the communication of intent that results from such

articulation and the coordinated, instrumental action that results from such communication;
- A mapping of the set of actions onto the set of actors. This will show which actor(s) performs which action.

Two features of a business pattern deserve further explanation—the partition of the set of actors into humans, machines, and artifacts and the partition of the set of actions into actions of articulation, communication, and coordination. First, the partition of the set of actors is proposed to better account for the nature of sociotechnical action. Real patterns of routine action in some domain of organization are almost never carried out by humans alone. Such patterns are better conceptualized as sociotechnical ensembles of actors [11] that include not only machines such as computers but also artifacts such as records or data structures more broadly [81]. Second, the partition of actions is proposed to better account for the relationship between representation, communication, and coordinated performance in any constructive conceptualization of the accomplishment of organizing. This partition therefore defines a business pattern as a complex of three types of coupled action, which we refer to as articulation, communication, and coordination.

Consider the domain of online grocery. Actors in the domain consist not only of humans (customers) but also information and communications technologies (ICT), such as websites, as well as data structures, such as shopping lists, product records, and sales orders. Articulation of a data structure such as updating a shopping list serves as a communication between the customer and the website in the sense that it directs the website to take some coordinated action, namely, placing a sales order for a product with the company sales-order processing system.

A given business pattern can also be considered either as a pattern in principle or a pattern in practice. A pattern in principle is an abstraction that represents the ideal or schematic form of routine action in some domain. A pattern in practice consists of a collection of specific actions undertaken by specific actors in specific places and at specific times. Our description of articulating, communicating, and coordinating action through an online shopping list would be considered a pattern in principle. The actual scenarios of defined customers creating specific shopping lists through interaction with online grocery websites and databases would constitute patterns in practice. These two viewpoints are mutually constituted through structuration [44]. Patterns in principle constitute resources for actors that enable and constrain the performance of patterns in practice. Patterns in practice constitute actual performance that creates and re-creates patterns in principle. This helps explain how patterns are not just repetitive but potential catalysts for organizational change.

We concur with Baden-Fuller and Morgan about the value of business modeling [9]. We propose that a business pattern can be seen as an appropriate design theory for use in business modeling, in the sense that it provides a suitable way of expressing some domain of sociotechnical organization [9]. We further suggest that business patterns may be useful as sense-making devices [102]—as "recipes" that managers can adopt and

adapt within benchmarking, reuse, and strategy making [7]. We particularly suggest their value in the development of digital business strategy, where there is typically a clear need to improve communication between general business managers and technologists. We propose their efficacy for understanding and thinking through the subtle interactions between technological and activity change.

Teece [94] argues that although technological innovation and business model innovation tend to be conflated they are not necessarily the same. Baden-Fuller and Haefliger [7] argue for considering technology innovation and business model innovation as a process of two-way interaction. In the idea of a business pattern we want to establish technologies as central actors in some business model. This, we think, gives us a more nuanced way of understanding the linkages between technology (particularly information technology [IT]) and value creation. Like Baden-Fuller and Haefliger [7] we use business patterns particularly to highlight the way in which contemporary innovation in business models is frequently linked to technological innovation, particularly to innovation through use of information technology.

Like Zott and Amit [108] we think it important to build business models from activities or action. We see a business pattern as an interrelated set of actions designed to achieve some form of value creation. But business patterns are not business processes. Business processes [64] use a similar system's view of organization but are deficient as a design theory for modeling sociotechnical systems, mainly because they tend to conflate the social with the technical. In other words, the idea of a business process typically abstracts out any notion of actors taking action. Upon a business process, both actors and their action are typically reified as the "mechanical" transformation of various forms of "stuff." We consider the differences between business processes and business patterns in more detail in a later section.

The idea of a business pattern is similar to Osterwalder, Pigneur, and Tucci's [75] idea of a metamodel for a business model. But in modeling practice, business patterns [75] can be considered in principle as types or in practice as instances of business practice. Business patterns in principle are ideal types of business practice [9], while business patterns in practice are descriptions of actual ongoing practice. Indeed, the design theory of a business pattern may allow more explicit abstraction between type and instance in terms of some domain of sociotechnical action. However, unlike Osterwalder, Pigneur, and Tucci [75], we do not assume that a business pattern should cover *all* of an organization's core "logic." A business pattern can be used to express part of such "logic," particularly that part deemed important to change.

A business pattern can be considered a narrative [60] of action appropriate to either some current (as-is) or some envisaged (as-if) domain of organizing—a distinction evident in the work of Osterwalder, Pigneur, and Tucci [75]. It is a particular way of making sense [60] of the "logic" of operations appropriate to some organization. A business model for us is a *narrative* of how the business works (or should work). This means that the representation of a business pattern should answer Magretta's "narrative"

test but will not answer Magretta's "numbers" test. A business pattern does not provide an expression of motivation such as an improved revenue stream or achieving good customer service directly. Any such expression of the purpose of some business pattern, should be represented in a linked business motivation model. Hence, we believe that the modeling proposed by Casadesus-Masanell and Ricart [24] does not provide a business model, it provides a model of motivation—a model of choices (goals) and consequences. Such motivation will be realized through changes to business patterns. The concept of motivation is deliberately chosen here instead of issues such as revenue because, as Baden-Fuller and Morgan [9] cogently argue, public-sector and voluntary-sector organizations will have the need to express the purpose of change differently from the typically narrow profit motive of the private-sector organization.

Likewise, business patterns are not the same as strategic models [87]—they represent the end-points of either current strategy or envisaged strategy. In this sense a business pattern is consistent with the view of Casdesus-Masanell and Ricart who define the relationship between business strategy and business model in the following terms—"strategy refers to the choice of business model through which the firm will compete in the marketplace" [24, p. 196]. Like Casadesus-Masanell and Ricart, we think that strategy details choice of business model. Such choice should clearly relate the motivation for changing business models. Likewise, tactics relates to the implementation of some chosen business model. The residual choices open to the firm are part of the ways in which the firm achieves instantiation of some chosen ideal type of business model [70].

Figure 1 illustrates some of the distinctions made between business motivation, business model, and business strategy, alluded to in this section. Business motivation involves the need to document explicit reasons for changing an existing (as-is) business model, such as enhancing revenue or better adapting to market changes. The equifinality of business models as open systems means that more than one envisaged (as-if) business model may fulfill one or more aspects of expressed motivation. Business strategy

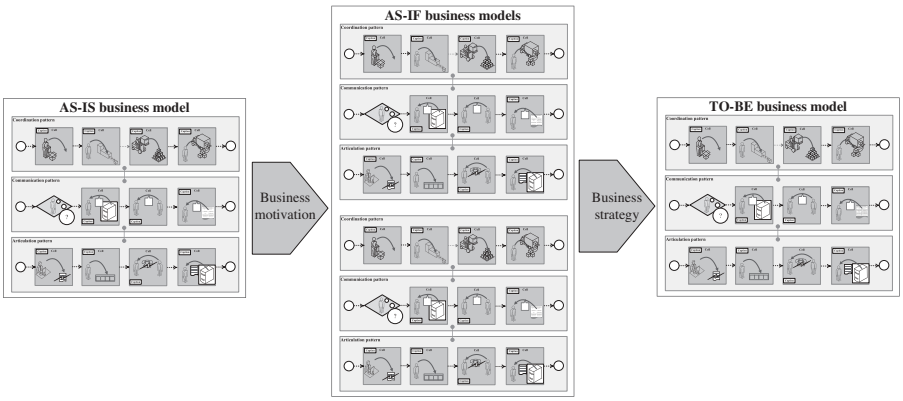

Figure 1. Business Motivation, Models, and Strategy

involves optimizing the selection among as-if models and specifying courses of action to implement a new (to-be) business model for the chosen domain.

Pattern Comics

We propose the value of visualizing business patterns as narratives. Much recent business literature emphasizes the advantages of visualization [20]—of producing pictures rather than words to communicate something. Typically, such visualization aids other forms of communication such as oral or written communication. Some advantages claimed for visualization include being faster for people to process the message, being more easily remembered for longer, having more of an impact on the viewer than the spoken word, being better at avoiding ambiguity in communication, and being more efficient at capturing detail or complex messages [22].

Visualization has, of course, been an accepted part of business analysis practice for many decades, in areas such as process modeling, information modeling, and data modeling [19]. More recently, the term visualization has become associated with ideas of data or information visualization as practiced in the field of business intelligence. Visualization is also seen as appropriate in the context of qualitative research in social science, particularly as a means of "capturing" the viewpoints of varying social actors [62]. There has also been an attempt to promote visualization more generally in managerial practice in areas such as business model generation [73] or strategy making [101].

Our approach to visualization differs from such approaches. First, our visualizations of business patterns are much broader in scope than data or information visualizations. We are interested in ways of visualizing patterns of action rather than in presenting statistical patterns in innovative ways pertinent to some data set. Second, visualization practices in business analysis (such as process models) are typically technocentric. By this we mean that they are typically used as a means of documenting and communicating requirements between technical actors. In contrast, our approach is meant to be business-centric. We want to offer a way of encouraging businesspeople themselves to think about sociotechnical patterns. Third, our approach to visualization is closer to that of business model generation, the use of visualization for strategy exercises, and the use of "journey maps" for service design. They carry the same intent of acting as a relatively free-form tool for the analysis and design of business organization. However, our visualizations exploit a background of theory [10] that helps structure the narrative of action constituting some business pattern. This, we feel, acts as a useful focus for enabling cocreation of such visualizations between business modelers and business actors.

We have found that the production of comics to represent business patterns is an effective means for getting businesspeople to think like business analysts [13]—not only managers but also various other levels of employees in particular organizations. Comics are particularly useful as instantiations of business patterns for the following reasons. First, they are both a visual and

textual genre. Comics are a unique hybrid that exploit in a free-form way the strengths of both images and text as media for portraying a coherent storyline [43]. Second, comics are well-known and well-read as a popular genre. Because of such familiarity, as intermediate representations, comics appear to be readily accepted and understood by nontechnical actors. Third, this genre is particularly well-suited for expressing the ways in which actors take action. They are also good at expressing the transformation resulting from designated actions. Fourth and finally, comics use well-established conventions for expressing events as "movement" of action through time and space. Therefore, they offer a particularly useful way of expressing the dynamics of business patterns, such as routine work.

The structure of the comics we use to represent routine sociotechnical action is illustrated in Figure 2. In terms of the need to represent both actors and action, our use of comics as representational devices clearly puts actors at the center of action and uses accepted conventions for expressing movement and transformation through a narrative. Each such pattern comic is made up of a series of panels, with each panel consisting of one or more cells. Dotted arrows between cells are used to establish the chronology of the narrative. Each cell is generally used to represent a snapshot of action in an overall plot and a linked series of such cells is used to narrate the

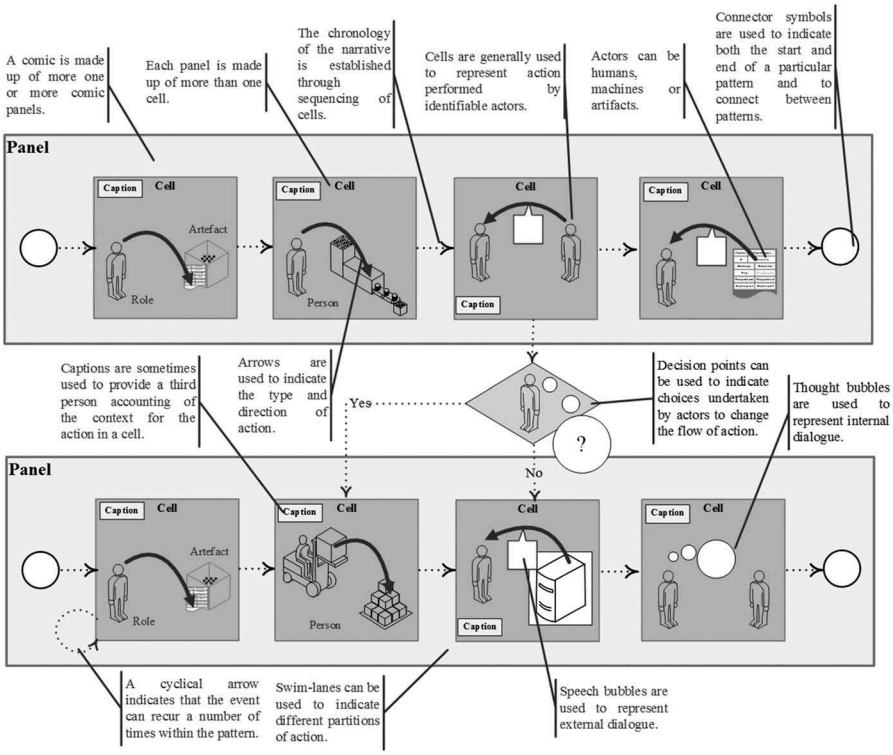

Figure 2. Elements of a Pattern Comic

storyline. When actors are represented, speech bubbles (to indicate external dialogue) and thought bubbles (to indicate internal dialogue) are attached to pictured characters—particularly in patterns of communicative action.

In our comics, named mannequins are used to denote either human actors in the case of patterns in practice or roles in the case of patterns in principle. Nonhuman actors such as IT systems are indicated with appropriate icons. Our use of communicative patterns is important for documenting the ways in which material artifacts such as data structures act. Artifacts, such as orders or product records, are clearly indicated as displaying "textual" agency [29]. Hence, our representations offer a tool for disentangling "the relative contributions of the actions taken by humans and those taken by computers or other non-human actors" [81, p. 1486].

In terms of adequately representing the spatiotemporal sequence of action, we have found our use of comics to be effective as narrative devices—as means of telling a story of either how things happen or how organizational actors would like things to happen [79]. In our comics, the temporal sequence of action is indicated through dotted arrows between cells. When representing patterns in practice, the precise location of each act is annotated on each cell within a panel. Also, the start- and end-time of each act/cell can be indicated in a comic.

Traditionally, the design artifacts produced in the analysis and design of sociotechnical systems are constructed with the needs of analysts in mind rather than organizational actors, implicitly framing such activity as a technocratic endeavor. The design artifacts proposed in this study are an attempt to break with this tradition and reestablish some of the tenets of participatory, collaborative, or cocreative design [28]. The central design artifact proposed is created with the express purpose of opening up dialogue and establishing common ground between analysts and organizational actors about the nature of some domain of sociotechnical action. Common ground is the mass of knowledge, beliefs, and suppositions that participants in some discourse believe that they share with one another. The purpose of such discourse is typically to advance, accumulate, or update such common ground [27]. This approach appears compatible with the idea of open business model innovation [33]. We have used pattern comics as an intermediate and user-centric representation in business modeling. Pattern comics lie somewhere between formal specification approaches such as BPMN (Business Process Model and Notation) for process modeling [96] and informal specification approaches such as a written description.

It is possible to envisage pattern comics being used for business modeling in different ways (see Table 1). In terms of layers of sociotechnical organization, patterns of articulation, communication, and coordination as forms of action can be drawn as comics. Such comics may be similar to scenarios comprising documented, observed action of routines in practice. They may also be abstractions—narratives of routines in principle. But pattern comics can also be used as tools for design—as ways of suggesting the form of envisaged (as-if) sociotechnical action. Pattern comics might also be useful as tools of strategic implementation. Abstractions contained within a pattern

Table 1. The Potential Use of Pattern Comics for Business Modeling.

Business modeling	***As-is* (current)**	***As-if* (envisaged)**	***To-be* (planned)**
Pattern			
Articulation	Pattern in practice/Pattern in principle	Pattern in principle	Pattern in practice
Communication	Pattern in practice/Pattern in principle	Pattern in principle	Pattern in practice
Coordination	Pattern in practice/Pattern in principle	Pattern in principle	Pattern in practice

comic might offer potential as a resource in change management intervention (to-be).

Making Sense of Online Grocery in Terms of Business Patterns

Consider the domain of online grocery—particularly the customer-side or customer-chain events relevant to the business models adopted by food retailers. The account given here is built from a case database [106] of literature comprising documentation published both by food retailers themselves and consultancies dealing with food retail. All the supermarket chains in the UK operate a traditional model of supermarket retail designed to manage the flow of physical goods from suppliers to customers. This involves maintaining a large floor-space stocked with products. Customers travel to the supermarket, pick products from the shelves, and transport them home themselves. At present this domain uses one or more different business patterns for online grocery [57]. Each pattern involves a significant departure from the "narrative" of food retail, which helps explain the clear differences between business models among online grocery retailers. Five key business patterns dominate—stock from store, stock from conventional warehouse, stock from "dark stores," click and collect from store, and click and collect from collection points. Some grocers adopt more than one such business pattern for operating online grocery [85].

Tesco was the first supermarket in the UK to innovate a stock-from-store business pattern of online grocery and developed this as an adjunct to its traditional grocery retail operations. In this pattern, customers order goods through a website. The order is sent to the server computer of the supermarket store nearest the customer's home. Picking lists for up to six customers at a time is produced from this server for a store operative working in the nearest supermarket store to the customer delivery point. This is loaded on to a "picking trolley," which uses shelf-identifier software to plan the most efficient route through the store. The operative walks around this store and acts as a "virtual shopper" picking products to satisfy the customer order and scanning the products to confirm they have been picked. Once the order is complete, the customer shopping basket is crated and delivered by van to the customer's home, in return for a delivery charge. A pattern comic illustrating the communicative actions involved in this business pattern of

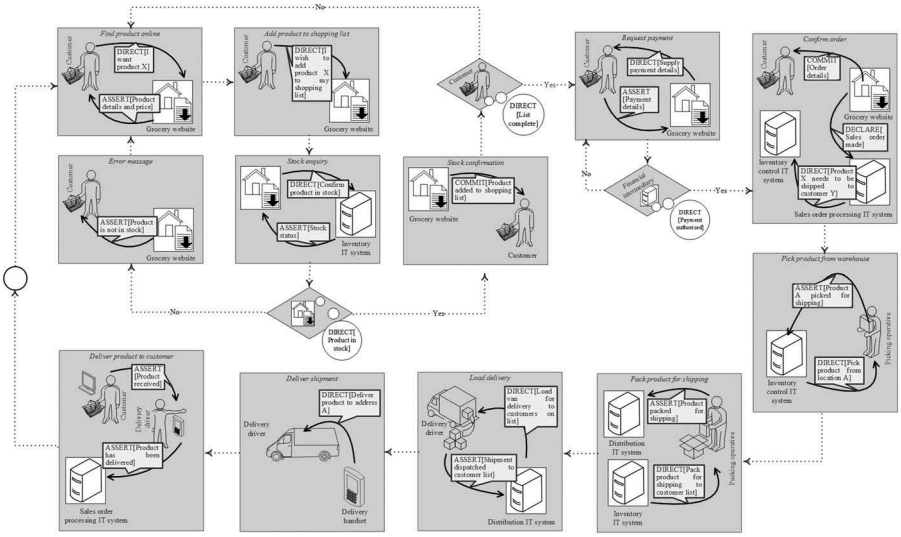

Figure 3. Stock from Store as a Communication Pattern

online grocery is provided in Figure 3. This is an as-is communicative pattern in principle.

The stock-from-store pattern was an easy business pattern to develop for Tesco as an initial "brick and mortar" company making the transition to a "click and mortar" company. Tanskanen, Yrjola, and Holmstrom [93] argue that this business pattern of picking from a local store works out as the least expensive option to innovate online grocery for an existing brick-and-mortar operation. This is because it allows rapid expansion with limited investment in terms of changes to established business operating patterns such as logistics and IT infrastructure [17]. However, this pattern for online grocery does suffer from problems such as customers experiencing a high level of substitutions when stock becomes unavailable in nominated supermarket stores. Conventional shoppers in supermarkets operating stock from store can also become irritated with the presence of many virtual shoppers competing with them for space to shop [35].

Business motivation involves the need to document explicit reasons for business change and thus expresses the relationship between ends and means. The key advantage of the approach suggested in this article is that business change can be expressed in terms of the transition between an existing pattern and one or more envisaged business patterns. A business motivation model in this sense should clearly express the "costs" and "benefits" associated with the transition between one business pattern and another. Both cost concerns and customer dissatisfaction provided the motivation for Tesco to investigate other as-if patterns of conducting online grocery. Other motivation was to attempt to emulate the best practices of online grocers such as Ocado, which have always operated a business pattern in which groceries are delivered from conventional warehouses. In

response to this competitive environment and the increasing business being done in online grocery, Tesco has invested considerable effort in advancing a new business pattern for online grocery. Tanskanen, Yrjola, and Holmstrom [93] argue that as sales volume grow, picking groceries from a dedicated warehouse works out as the least expensive strategy for brick–and-mortar operators. In certain areas of the UK, Tesco as the dominant grocery retailer now delivers foodstuffs to homes from so-called dark stores. The term dark store refers fundamentally to a business pattern in which a retail outlet or distribution center operates exclusively for online shopping.

In achieving this strategic change, it is evident that Tesco effectively designed an as-if pattern in principle, which built upon some elements of its earlier stock from store pattern, as well as reusing elements of a pattern adopted by its competitors. Hence, the front-end activities in the pattern, such as creating a customer shopping list via a website and producing a sales order from this, remained the same in terms of actors and actions. The major differences clearly lie in back-end events where fulfillment of orders and delivery of orders is now done from strategically placed warehouses and transshipment points.

The idea of a business pattern suggests that we can observe common patterns of sociotechnical organization across different organizations or their parts. In this sense, the idea of a business pattern has resonance with the idea of best practice and process benchmarking [90]. For example, recently many online grocers have started to operate a modified business pattern (generally referred to as click and collect) in which customers order a list of groceries to be collected from a nominated supermarket store. This emulates a business pattern that is being offered across other areas of online retail [21] and appears to be one example of what Weill and Vitale [103] refer to as the second wave of digital business. In this second wave, existing firms evolve digital business models that attempt to combine "the best of place and space," while breaking down barriers between traditional categories of digital business such as B2C and B2B.

The key motivation for moving to a "click-and-collect" pattern for grocery retailers here is that they can reduce delivery costs. It also serves to address some of the difficulties involved in online orders tending to clump at the beginning and end of the working week [35]. But the motivation also includes improving value for customers in that they can access given products at a time and place of their choosing rather than wait at home for delivery of groceries. From what is known of the ways in which online grocers operate it is evident that these organizations share a core set of actions in terms of this business pattern in principle. A click-and-collect pattern also shares sequences of action with both a stock-from-store pattern and a stock-from-warehouse or stock-from-dark-store pattern. It should therefore be possible to use pattern comics as a way of being more precise about the taxonomy of business models in current use within a delimited domain of digital business. The taxonomy of online grocery, for instance, might be developed inductively [34] from a close analysis of pattern differences. But taxonomy may also be used as a design tool—as a way of

considering possible options using as-if business models to populate the design space for strategy making.

Business Patterns, Business Processes, and Rich Pictures

Certain problems exist in attempts to turn the orienting principle of a sociotechnical system view into a coherent way of understanding and engaging with organizational action and change. First, in attempting to analyze and design sociotechnical systems, due and equal justice must be given to both work (social) systems and technology (technical) systems. Second, the ways in which work and technology entangle in practice should be evident in any representations we make of such systems. Third, the narrative of such systems should be evident from such representation. Finally, both actors and action should be explicit in any such narrative.

Traditionally, approaches to analysis and design of sociotechnical organization privilege either the technical system or the work system [71]. Hence, most process modeling approaches focus on documenting the workings of technical systems [66], while approaches such as value-stream-mapping or Kanban [5] tend to emphasize the design of work systems. There have been attempts to provide a more balanced accounting of the two domains of system. Mumford's ETHICS [69], for instance, proposes the parallel conduct of two streams of analysis and design: one directed at proposing the most effective technical system for some problem situation; the other proposing the most effective work system for the same situation. Checkland's [25] soft system methodology adopts a similar orientation of attempting to conceptually model soft (work) systems as well as hard (technical) systems. However, a significant problem remains with such approaches, namely, that a further explicit, and frequently uncomfortable, stage is required to meld the chosen work system with the most appropriate technical system.

The idea of narrative has had limited influence in design science. The idea of a scenario [23] as used in human–computer interaction (HCI) has some similarity with that of narrative used here. Use cases are also frequently described as *stories* or *user stories* in UML [86]. Williams [104] refers to rich pictures as cartoon-style diagrams of some challenging situation. He proposes rich pictures as symbol systems useful in management consulting for surfacing the organizational unconscious. Monk and Howard [65] see rich pictures as particularly useful in participatory design and lightweight usability engineering. This explains why rich pictures have potential as a way of visualizing key actors (stakeholders), issues, and perspectives relevant to some business pattern and why they might provide some focus to the process of forming an initial set of pattern comics. However, we feel that pattern comics provide much more range than other techniques familiar from within soft system methodology (SSM) such as conceptual models. Conceptual models in SSM overlap in some ways with pattern comics but are particularly limited in the ways in which they differentiate both actors and action.

As "activity models" business processes appear to have a surface similarity with business patterns. Melao and Pidd [64] argue that there are four different viewpoints on the nature of a business process, which influence approaches in areas such as process modeling and mapping. Two of these viewpoints are similar to the metaphors of organization employed by Morgan [67]—that of thinking of business processes as deterministic machines and complex dynamic systems. A third viewpoint introduces clearer notions of control into the concept of a business process and thinks of it in terms of interacting feedback loops. The fourth viewpoint has particularly influenced the work discussed here. This views a business process as a social construct. It is in this sense that we have exploited lessons from a cognate literature within organization science to build a conception of a business pattern founded in the nature of organizational routines. However, we have extended the notion of both actors and action familiar in constructive definitions of the organizational routine to include the performativity of machines and artifacts.

The notion of a business process is clearly an attempt to apply this systemic idea of defined transformations to that of organization. In its most deterministic guise an organization is considered as a series of operational processes that are regulated by one or more control processes. As a complex, dynamic, or adaptive system an organization is considered an open system in which inputs from the environment of the organization are transformed into outputs that are returned to this environment [37]. However, the small amount of literature that critiques the idea of a business process tends to support many of the lessons underlying our construct of a business pattern. Buchanan [18], for instance, found in his attempt to apply a process orientation to the scheduling of patients in acute hospitals that visualizing "processes" through techniques such as process mapping was only effective when conducted with staff participation and with the aim of fostering cross-functional awareness and understanding. Lindsay, Downs, and Lunn [59] critique the dominant "machine" view of a business process and support the idea of thinking through the practice of process modeling in terms of a social constructivist viewpoint.

This suggests that the process idea adopted in the literature of both business processes and process modeling is limited and limiting, particularly as a conception of sociotechnical organization, for a number of reasons. At a high level, the concept of a business process is deficient as a design theory for modeling sociotechnical systems, mainly because, like many methods mentioned, it tends to conflate the social with the technical. The idea of a business process typically abstracts out any notion of actors taking action. On the process model, both actors and their action is reified as the "mechanical" transformation of various forms of "stuff." Processes are treated as black boxes that transform stuff such as physical or tangible things or immaterial or intangible things. The transformation of stuff is also not elaborated in terms of the differences it makes for action. Hence, it is particularly unclear how flows of data relate to flows of physical material. On a process model, flows of tangible or intangible "stuff" serve to connect sequences of black boxes and different routes through the flow are enacted through abstract

decision points that select between alternative sequences of flows and transformations. In this form of representation, decision strategies are thus divorced from notions of specific actors making specific decisions.

In service design [55, 92, 98], various techniques are used as attempts to augment or enrich process models. These include journey maps, empathy maps, and customer life-cycle mapping. While some of these techniques attempt to introduce and represent ideas of actors making sense of organizing through action in various ways, most fall short of encompassing the range of features described for a pattern comic. For instance, journey maps or customer life-cycle maps typically provide the narrative of action from only one actor's perspective. They also fail to distinguish between different types of action important to the actor's experience of organization.

Conclusion

In this study we have attempted to rise to a number of the challenges set for business model research by Pateli and Giaglis [77] as it pertains to digital business: to clarify the essence of a business model and how it relates to other business concepts such as business strategy; to develop better business model ontologies; to provide better means of visualizing business models; to propose better ways of developing new business models and implementing change.

The article has described an innovative way of thinking about and engaging with business models as patterns. A *business pattern* refers to a coherent and repeating sequence of action involving humans, machines (including IT systems), and artifacts appropriate to some way of organizing. The study also described a way of visualizing either existing business patterns or envisaged business patterns through the design artifact of pattern comics. A pattern comic is a visualization that can be used to provide a narrative model of some business pattern in principle or in practice.

The article began with a distillation of five key lessons gleaned from the literature on business models. Business models are models in the sense of comprising abstractions of bounded areas of institutional reality. Business models are narratives in that they act as representations of how institutions either currently work or as how we would like them to work. Business models are not motivation models. A business model expresses the essence of the logic of some way of organizing. In contrast, a motivation model expresses how such logic meets established goals such as revenue generation or improved service delivery. Business models are activity models in that they portray the interrelationship between activities that serve to constitute some value-creating system. Finally, business models are particularly fruitful as ideal types that may be useful for reuse and benchmarking purposes.

The design theory associated with the concept of a business pattern as well as the design artifact of a pattern comic builds on these five key lessons. Therefore, business patterns and pattern comics offer defined contributions

to the literature on business models. First, a business pattern expressed through pattern comics permits a clearer delineation of what a business model is and is not. In particular, it allows a clearer distinction to be drawn between business strategy, business motivation, and business model. Second, the process of building pattern comics as representations of delimited institutional domains suggests a clearer way of making sense of models of "business" (organizing) either as currently conceived (as-is) or in terms of envisaged models (as-if). This allows a clearer expression of business motivation in terms of transitions between as-is and as-if business patterns as well as a clearer expression of business strategy in the choice and implementation of to-be business patterns. As Chesbrough intimates, "by providing depictions of both current and prospective business models, managers can quickly surmise many of the likely implications of making such a change" [26, p. 361].

There are clearly many areas of further work. First, Peffers et al. [78] suggest a model for design science research (DSR) having the following key stages: identifying problem and motivation; defining objectives and solution; detailing design and development; demonstrating applicability in use; evaluating outcomes; and communicating lessons. Clearly the work described in this study only addresses the first three stages of this DSR model in any real depth. We have demonstrated some of the limitations of current approaches to business modeling for sociotechnical purposes and gleaned some of the parameters needed for a more satisfactory approach to digital business modeling. We have also discussed the development of a design artifact and its basis in a well-defined theory of business patterns. Hence, there is much scope for describing application and evaluation of the approach discussed here in various settings. Although we have validated on the micro level both the design theory of a business pattern and the design artifact of pattern comics in work conducted in production [14] and the supply chain [15], there is a need to test the business modeling approach proposed here in more macro-level exercises. Second, although we have suggested an idea of taxonomy in the current study as a way of being clearer about the classification and instantiation of business models, there are certain practical issues of how to form this taxonomy that demand further work. For instance, it is unclear currently how to effectively operationalize the notion of generalization/specialization between business patterns. Third, we wish to explore the separation between business and motivation models further by satisfying the call of Arend [6] to explore the value of the business model concept in nonprofit domains. In this vein, we are already starting to take this work further and investigate the application of business patterns to the growing area of electronic government (eGovernment), particularly the recent interest in redesigning aspects of public service delivery around digital public services. Fourth and finally, there is potential for exploring the efficacy of building some IT tool [33] for the construction of pattern comics, which might help further systematize the approach suggested here.

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